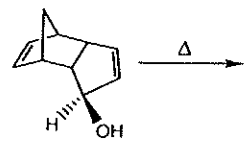
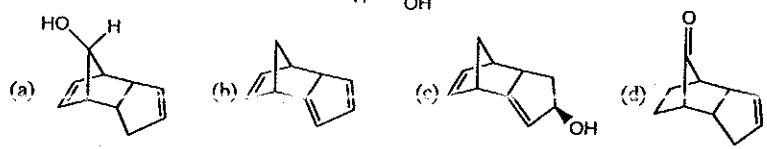
CAREER ENDEAVOUR
ACADEMY PRIVATE LIMITED
Best Institute for NET-JRF, GATE & IIT-JAM Exams

CSIR-UGC-NET/JRF|GATE CHEMISTRY

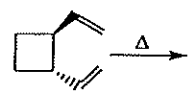
Assignment - PERICYCLIC REACTIONS

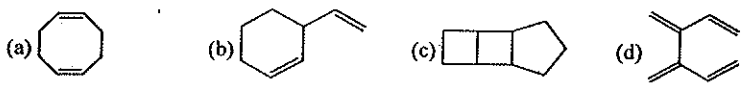
1. Product obtained in the following reaction is:



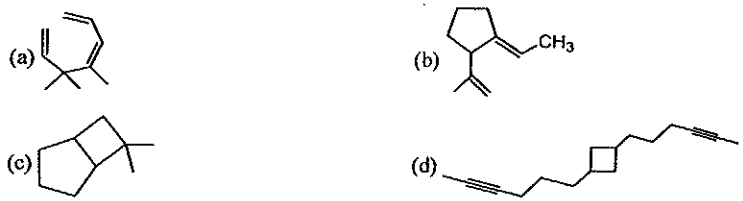


2. Product formed in the following reaction





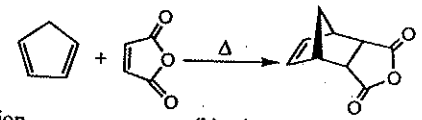
3. Identify the product of the reaction



4. Which one of the following Diels-Alder reactions is feasible?
   (a) Maleic anhydride + ethylene
   (b) Maleic anhydride + cyclopentadiene
   (c) Maleic anhydride + norbornadiene
   (d) Cyclopentadiene + benzene

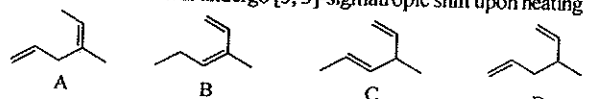
5. Cope rearrangement involves
   (a) [1, 5]-sigmatropic rearrangement
   (b) [4+2]-cycloaddition reaction
   (c) [3, 3]-sigmatropic rearrangement
   (d) 6π-electrocyclisation reaction

6. The reaction given below is an example of



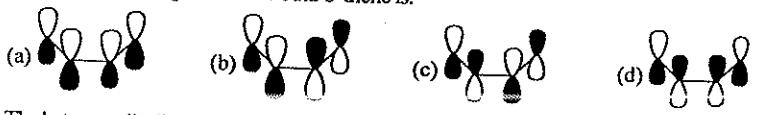
(a) $_{\pi}4_{s} +_{\pi} 2_{s}$ cycloaddition
(b) $_{\pi}4_{s} +_{\pi} 2_{a}$ cycloaddition
(c) $_{\pi}4_{a} +_{\pi} 2_{s}$ cycloaddition
(d) $_{\pi}4_{a} +_{\pi} 2_{a}$ cycloaddition

7. Which one among the dienes A-D will undergo [3, 3]-sigmatropic shift upon heating

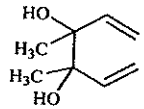


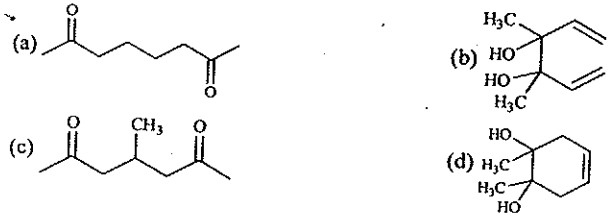
(a) A (b) B (c) C (d) D

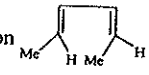
8. The LUMO of the ground state buta-3-diene is:



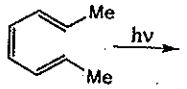
9. The heterocyclic diene employed in cyclo-addition reaction is:
(a) furan (b) pyrrole (c) 2, 5-dimethylpyrrole (d) thophene

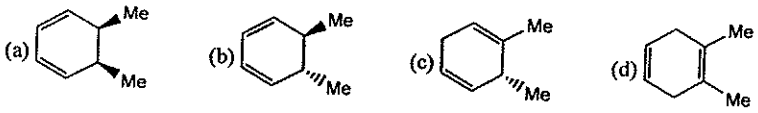
10. On heating  undergoes oxy-cope rearrangement to give



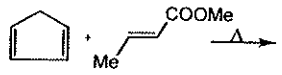
11. Transformation  to  is feasible by a
(a) Thermal disrotatory process (b) Photochemical disrotatory process
(c) Thermal conrotatory process (d) Photochemical conrotatory process.

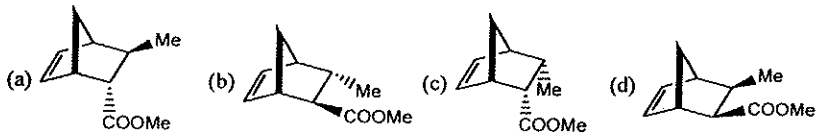
12. The product formed in the reaction given below is





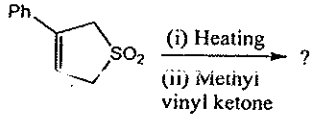
13. The major product formed in the reaction given below is

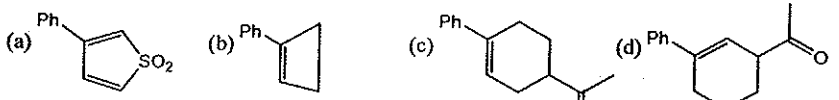




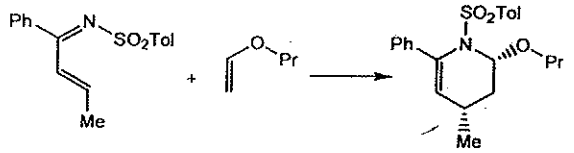
14. Which of the following is true for Cope rearrangement ?
(a) [1, 5] shift, intramolecular, uncatalyzed (b) [3, 3] shift, intramolecular, uncatalyzed
(c) [3, 3] shift, intramolecular, catalyzed (d) [1, 5] shift, intramolecular, catalyzed

15. Identify the product formed in the reaction.



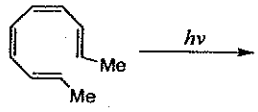


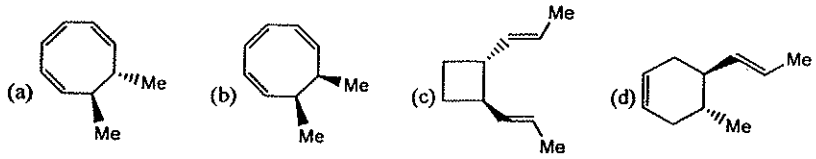
16. In the following Diels-Alder reaction, interaction between which of the frontier orbitals takes place?



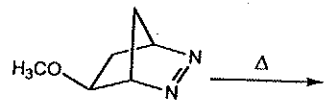
(a) HOMO of diene with HOMO of dienophile (b) HOMO of diene with LUMO of dienophile
(c) LUMO of diene with HOMO of dienophile (d) LUMO of diene with LUMO of dienophile

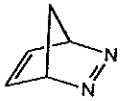
17. The major product obtained in the photolysis of the following tetraene is:



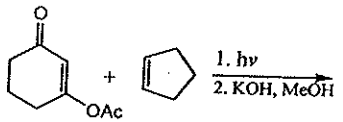


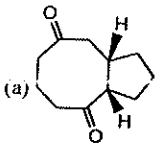
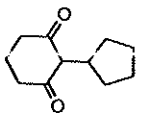
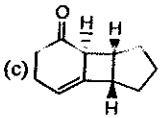
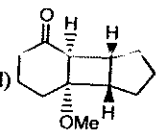
18. The major product formed in the following thermal reaction is



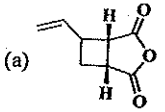
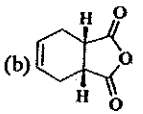
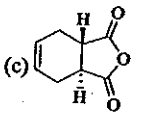
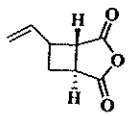
(a)  (b) H_3CO  (c)  (d) 

19. The major product formed in the following reaction sequence is



(a)  (b)  (c)  (d) 

20. Buta-1, 3-diene on heating with maleic anhydride would give

(a)  (b)  (c)  (d) 

21. The following is true for Cope reaction

(a) Occurs at low temp., tertiary amines are rectants, proceeds through SYN pathway
(b) Occurs at high temp., tertiary amine oxides are rectants, proceeds through SYN pathway
(c) Occurs at high temp., tertiary amine oxides are rectants, proceeds through ANTI pathway
(d) Occurs at low temp., tertiary amine oxides are rectants, proceeds through ANTI pathway.

ANSWER KEY

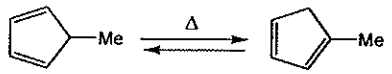
1. (a)	2. (a)	3. (b)	4. (b)	5. (c)	6. (a)	7. (d)
8. (d)	9. (a)	10. (a)	11. (c)	12. (b)	13. (a)	14. (b)
15. (c)	16. (c)	17. (b)	18. (d)	19. (a)	20. (b)	21. (b)

CSIR-UGC-NET/JRF|GATE-CHEMISTRY

PERICYCLIC REACTIONS

[NET-JRF| GATE | TIFR- Previous Years' Question]

1. The reaction given below is an example of **[NET June 2011]**

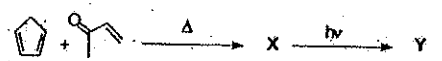


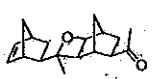
(a) 1, 3-sigmatropic hydrogen shift (b) 1, 3-sigmatropic methyl shift
(c) 1, 5-sigmatropic hydrogen shift (d) 1, 5-sigmatropic methyl shift.

2. The concerted photochemical reaction between two olefins leading to a cyclobutane ring is. **[NET June 2011]**

(a) $_{\pi}2_s + _{\pi}2_a$ cycloaddition (b) $_{\pi}2_s + _{\pi}2_s$ cycloaddition
(c) $_{\sigma}2_s + _{\sigma}2_s$ cycloaddition (d) $_{\pi}2_s + _{\sigma}2_a$ cycloaddition

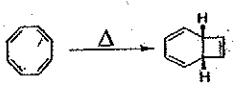
3. The structures of the major products X and Y in the following transformation are **[NET June 2011]**



(a) X=  Y=  (b) X=  Y= 

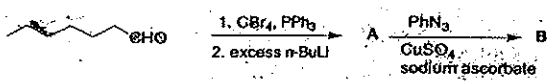
(c) X=  Y=  (d) X=  Y= 

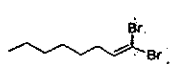
4. In the following concerted reaction, the product is formed by a **[NET Dec. 2011]**

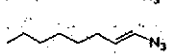


(a) 6π – disrotatory electrocyclisation (b) 4π – disrotatory electrocyclisation
(c) 6π – conrotatory electrocyclisation (d) 4π – conrotatory electrocyclisation

5. The major products A and B in the following reaction sequence are



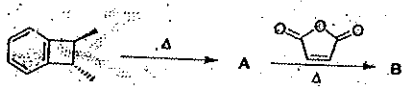
(a) A=  B= 

(b) A=  B= 

(c) A = B =

(d) A = B =

6. The major products A and B in the following reaction sequence are **[NET Dec. 2011]**



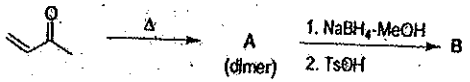
(a) A = B =

(b) A = B =

(c) A = B =

(d) A = B =

7. The major products A and B in the following reaction sequence are **[NET Dec. 2011]**



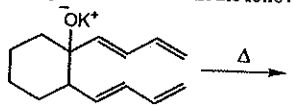
(a) A = B =

(b) A = B =

(c) A = B =

(d) A = B =

8. The product formed and the process involved in the following reaction are **[NET Dec. 2011]**



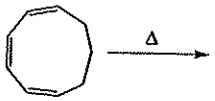
(a) [3,3]-sigmatropic rearrangement

(b) [1,3]-sigmatropic rearrangement

(c) [5,5]-sigmatropic rearrangement

(d) [1,5]-sigmatropic rearrangement

9. The major product formed in the following concerted reaction is **[NET June 2012]**

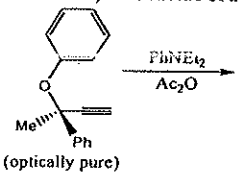


(a) (b) (c) (d)

10. The major product formed when (3R, 4S)-3, 4-dimethylhexa-1, 5-diene is heated at 240° is: **[NET June 2012]**

(a) (2Z, 6Z)-octa-2, 6-diene (b) (2E, 6E)-octa-2, 6-diene
(c) (2E, 6Z)-octa-2, 6-diene (d) (3Z, 5E)-octa-3, 5-diene

11. In the following pericyclic reaction, the structue of the allene formed and its configuration are **[NET Dec. 2012]**

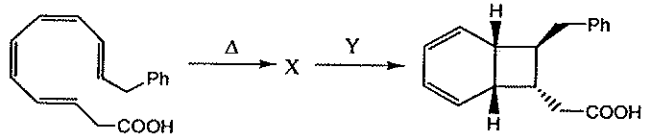


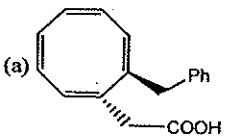
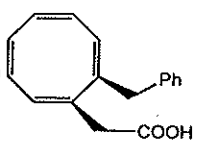
(optically pure)

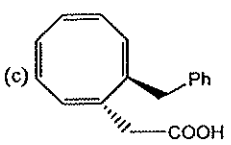
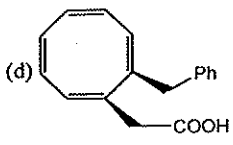
(a) R (b) S

(c) R (d) S

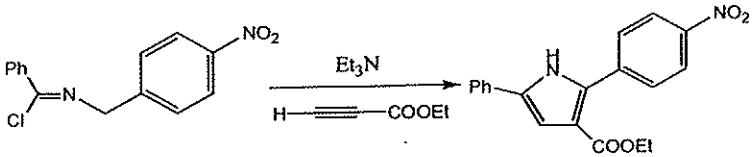
12. In the following sequence of pericyclic reactions X and Y are **[NET Dec. 2012]**



	X	Y		X	Y
(a)		*hv*/DIS	(b)		*hv*/CON

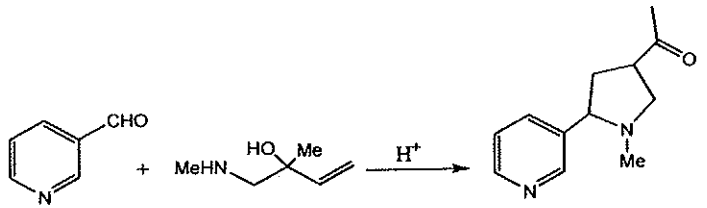
	X	Y
(c)		Δ/DIS
(d)		Δ/CON

13. The following conversion involves **[NET Dec. 2012]**



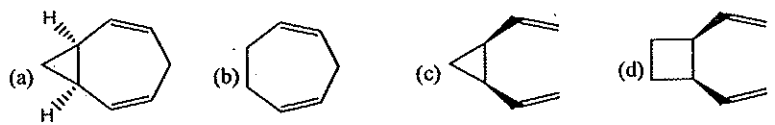
(a) a 1, 3-dipolar species as reactive intermediate, and a cycloaddition.
(b) a carbenium ion as reactive intermediate, and a cycloaddition.
(c) a 1, 3-dipolar species as reactive intermediate, and an aza Witting reaction.
(d) a carbanion as reactive intermediate, and an aza Cope rearrangement.

14. The following transformation involves **[NET Dec. 2012]**

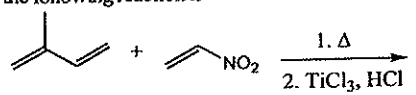


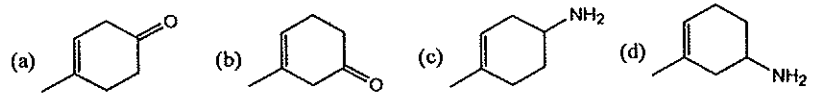
(a) an iminium ion, [3, 3]-sigmatropic shift and Mannich reaction.
(b) a nitrenium ion, [3, 3]-sigmatropic shift and Michael reaction.
(c) an iminium ion, [1, 3]-sigmatropic shift and Mannich reaction.
(d) a nitrenium ion, [1, 3]-sigmatropic shift and Michael reaction.

15. Among the following dienes, the one that undergoes a degenerate Cope rearrangement is **[NET June 2013]**

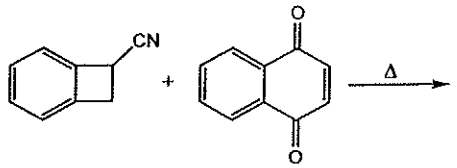


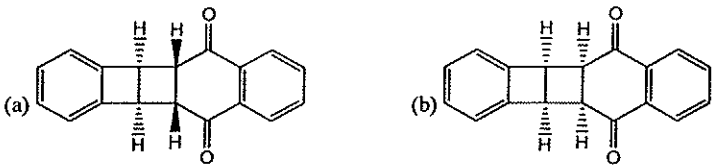
16. The major product formed in the following reaction is **[NET June 2013]**

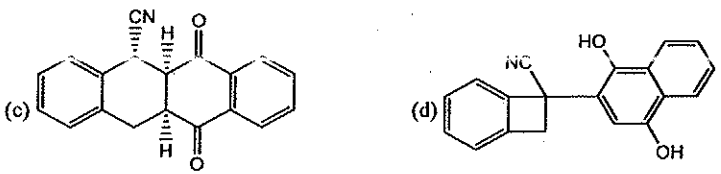




17. The major product formed in the following reaction is **[NET June 2013]**



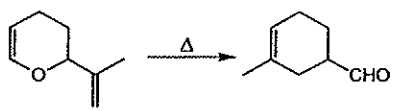




18. The most appropriate mode of cyclisation in the following transformation is **[NET June 2013]**

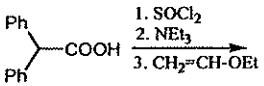
(a) con-rotatory in photochemical; and dis-rotatory in thermal conditions.
(b) con-rotatory in thermal; and dis-rotatory in photochemical conditions.
(c) con-rotatory in thermal; and con-rotatory in photochemical conditions.
(d) dis-rotatory in photochemical; and dis-rotatory in thermal conditions.

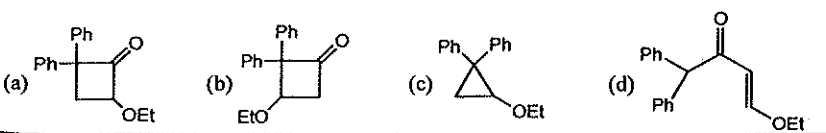
19. The following reaction proceeds through a **[NET Dec. 2013]**



(a) 1, 3-sigmatropic rearrangement
(b) 2, 3-sigmatropic rearrangement
(c) 3, 3-sigmatropic rearrangement
(d) 3, 5-sigmatropic rearrangement

20. The major product formed in the following reaction sequence is **[NET Dec. 2013]**

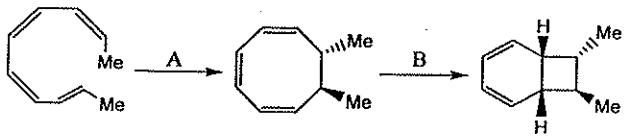




21. The number of nodes present in the highest occupied molecular orbital of 1, 3, 5-hexatriene in its ground state is **[NET Dec. 2013]**

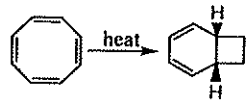
(a) one (b) two (c) three (d) four

22. The conditions A-B, required for the following pericyclic reactions are **[NET Dec. 2013]**



(a) A – Δ; B – Δ (b) A – hν; B – Δ (c) A – hν; B – hν (d) A – Δ; B – hν

23. The number of π electrons participating and the pericyclic mode in the following reaction are



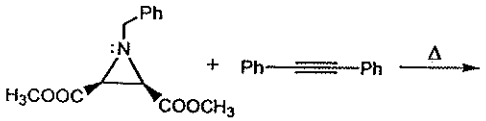
[NET Dec. 2013]

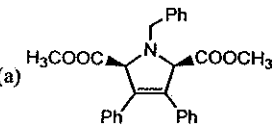
(a) 4 and conrotatory (b) 4 and disrotatory (c) 6 and conrotatory (d) 6 and disrotatory

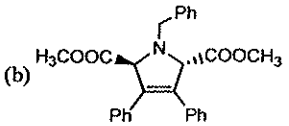
24. In a Diels-Alder reaction, the most reactiv diene amongst the following is **[NET June 2014]**

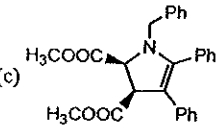
(a) (4E)-1, 4-hexadiene (b) (4Z)-1, 4-hexadiene
(c) (2E, 4E)-2, 4-hexadiene (d) (2Z, 4Z)-2, 4-hexadiene

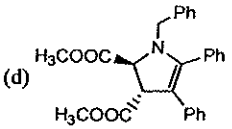
25. The major product formed in teh following reaction is **[NET June 2014]**



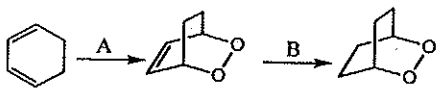
(a)


(b)


(c)


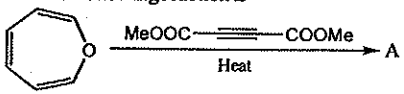
(d)


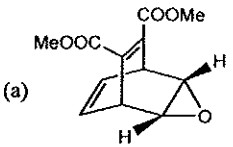
26. The correct combination of reagents for effecting the following sequence of reactions is **[NET June 2014]**

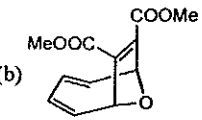


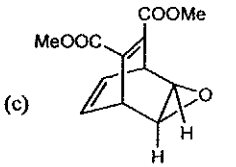
(a) A = O_3/O_2; B = K^+-OOC-N=N-COO$^-K^+$, AcOH
(b) A = O_2, Rose Bengal, hν; B = K^+-OOC-N=N-COO$^-K^+$, AcOH
(c) A = O_2, Rose Bengal, hν; B = H_2, Pd/C
(d) A = O_2, Rose Bengal; Δ; B = H_2, Pd/C

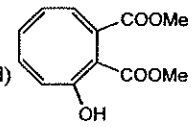
27. The major product A formed in the following reaction is **[NET June 2014]**



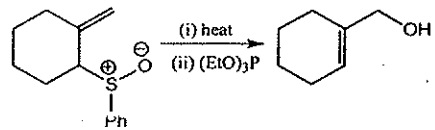
(a)


(b)


(c)


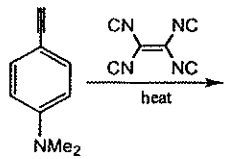
(d)


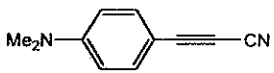
28. Pericyclic reaction involved in one of the steps of the following reaction sequence is **[NET June 2014]**



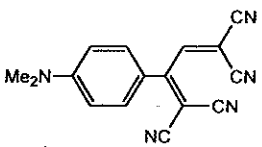
(a) [1, 3] sigmatropic shift (b) [3, 3] sigmatropic shift
(c) [1, 5] sigmatropic shift (d) [2, 3] sigmatropic shift

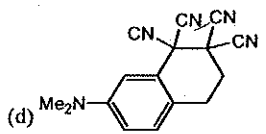
29. The major product of the following reaction is **[NET Dec. 2014]**



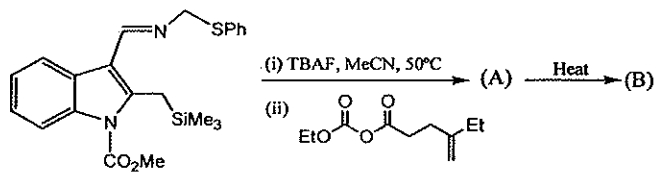
(a)


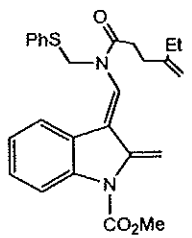
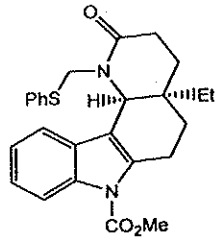
(b)

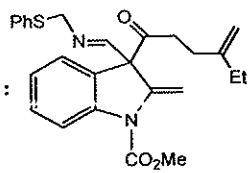
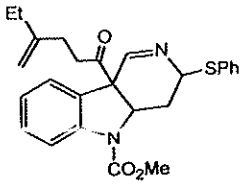

(c)


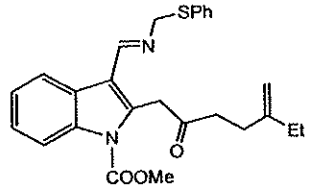
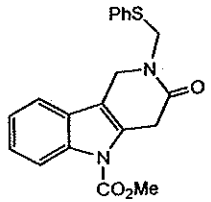
(d)


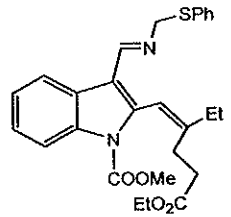
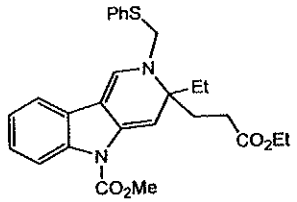
30. The products A and B in the following reaction sequence are **[NET Dec. 2014]**



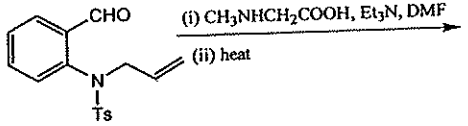
(a) **A :** 
B : 

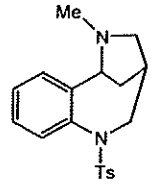
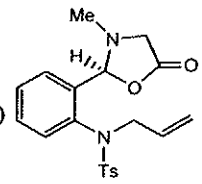
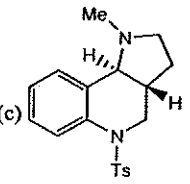
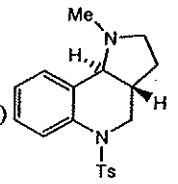
(b) **A :** 
B : 

(c) **A :** 
B : 

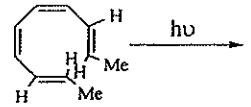
(d) **A :** 
B : 

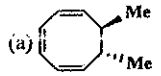
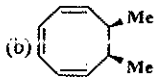
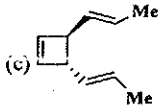
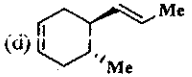
31. The major product of the following reaction is **[NET Dec. 2014]**



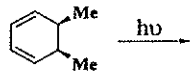
(a) 
(b) 
(c) 
(d) 

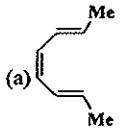
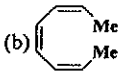
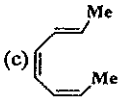
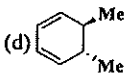
32. The following tetraene upon photolysis gives **[GATE 2000]**



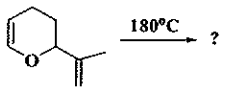
(a) 
(b) 
(c) 
(d) 

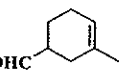
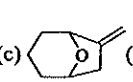
33. The product obtained during the following photochemical reaction is **[GATE 2001]**



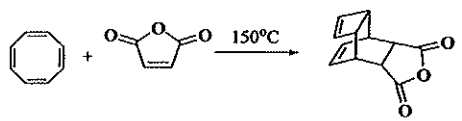
(a) 
(b) 
(c) 
(d) 

34. The major product formed in the thermal reaction given below, is **[GATE 2002]**



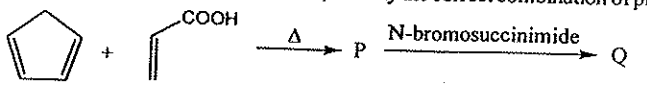
(a) 4(H) – Furan (b)  (c)  (d)

35. The two pericyclic reactions successively involved in the thermal transformation given below are

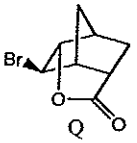


(a) 6π -electrocyclization followed by [4 + 2] π -cycloaddition **[GATE 2002]**
(b) 8π -cycloaddition followed by [2 + 2] π -electrocyclization
(c) 6π -cycloaddition followed by [2 + 2] π -electrocyclization
(d) 4π -electrocyclization followed by [4 + 2] π -cycloaddition.

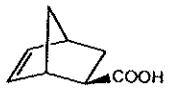
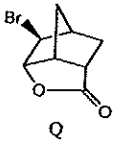
36. In the two step reaction shown below, identify the correct combination of products P and Q.



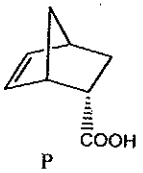
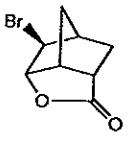
[GATE 2004]

(a)  and 

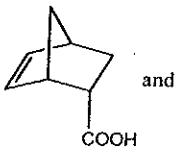
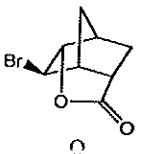
P Q

(b)  and 

P Q

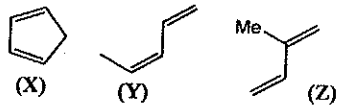
(c)  and 

P Q

(d)  and 

P Q

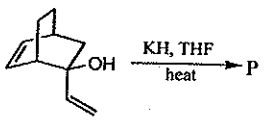
37. Order of reactivity of the following dienes X, Y and Z in Diels-Alder reaction is [GATE 2005]

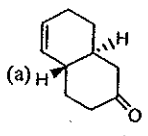
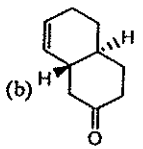
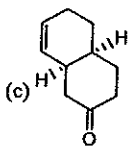
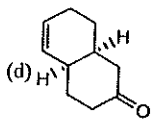


(X) (Y) (Z)

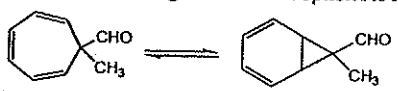
(a) X > Z > Y
(b) Y > X > Z
(c) Y > Z > X
(d) X > Y > Z

38. The major product P of the given reaction is [GATE 2005]



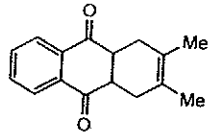
(a)  (b)  (c)  (d) 

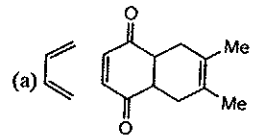
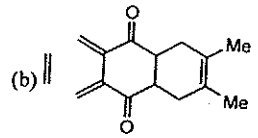
39. Select the correct classification in the following reaction from option I to IV gives below. [GATE 2006]

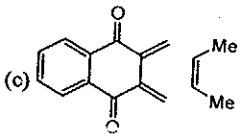
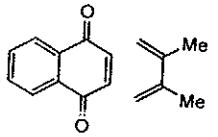


(I) Conrotatory electrocyclic reaction
(II) Disrotatory electrocyclic reaction
(III) Valence isomerization
(IV) $[{}_{\pi}4_{s} + {}_{\pi}2_{a}]$ cycloaddition reaction
(a) I and III (b) II and IV (c) II and III (d) I and IV

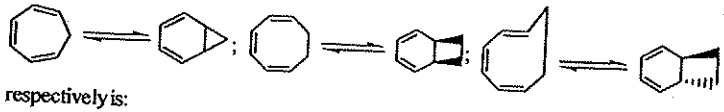
0. The most appropriate starting materials for one step synthesis of the compound (I) are [GATE 2006]



(a)  (b) 

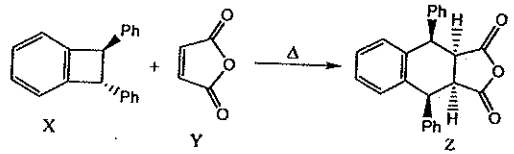
(c)  (d) 

41. The direction of rotation of the following thermal electrocyclic ring closures. [GATE 2007]



respectively is:
(a) Disrotory, disrotatory, disrotatory
(b) Conrotatory, conrotatory, conrotatory
(c) Disrotatory, disrotatory, conrotatory
(d) Disrotatory, conrotatory, disrotatory.

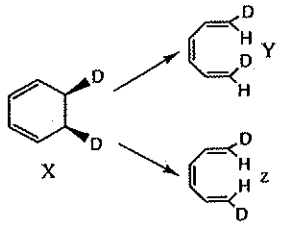
42. The reaction between X and Y to give Z proceeds via [GATE 2008]



X Y Z

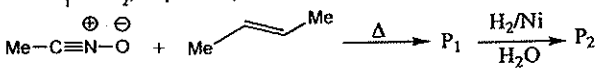
(a) 4π – conrotatory opening of X followed by endo Diels-Alder cycloaddition.
(b) 4π – distortary opening of X followed by endo Diels-Alder cycloaddition.
(c) 4π – conrotatory opening of X followed by exo Diels-Alder cycloaddition
(d) 4π – disrotatory opening of X followed by exo Diels -Alder cycloaddition.

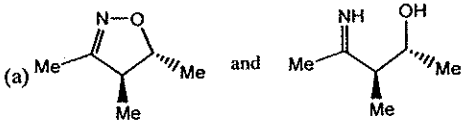
43. The products Y and Z are formed, respectively, from X via [GATE 2008]

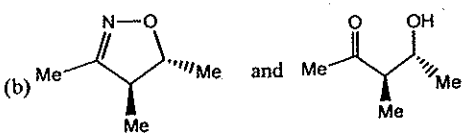


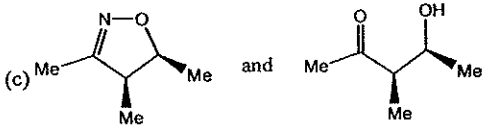
(a) hυ. conrotatory opening and Δ, disrotatory opening.
(b) hυ, disrotatory opening and Δ, controtatory opening.
(c) Δ, conrotatory opening and hυ, disrotatory opening.
(d) Δ, disrotatory opening and hυ, conrotatory opening.

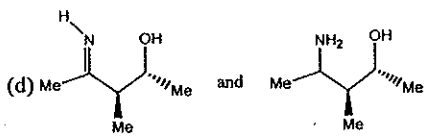
44. The Major products P_1 and P_2, respectively, in the following reaction sequenc are [GATE 2008]



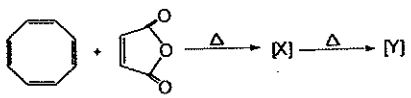
(a) 

(b) 

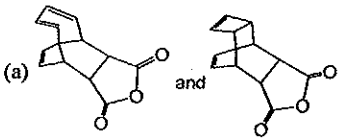
(c) 

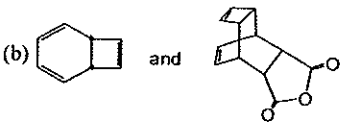
(d) 

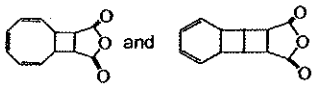
45. In the reaction sequence : [GATE 2009]

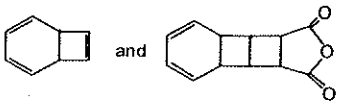


X and Y, respectively, are

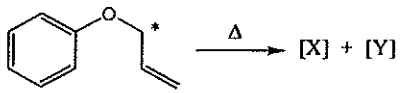
(a) 

(b) 

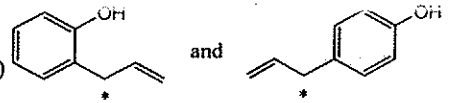
(c) 

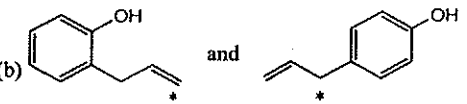
(d) 

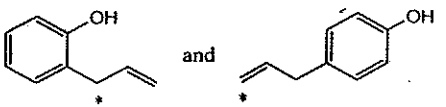
46. In the reaction [GATE 2009]



the major products X and Y are

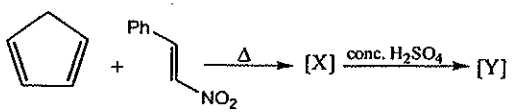
(a) 

(b) 

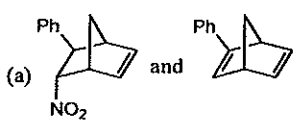
(c) 

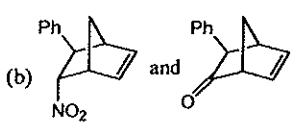
(d) None of these

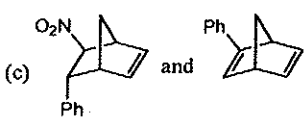
47. In the reaction sequence [GATE 2009]

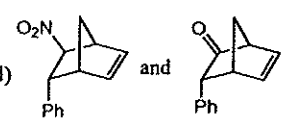


The major products X and Y, respectively are

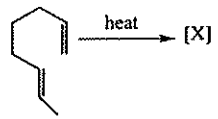
(a) 

(b) 

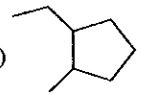
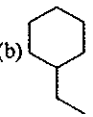
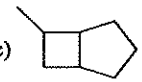
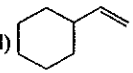
(c) 

(d) 

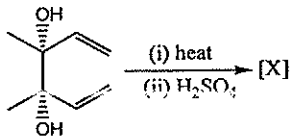
48. In the reaction **[GATE 2010]**



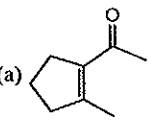
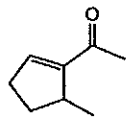
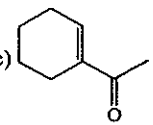
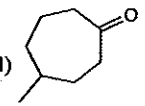
the major product [X] is

(a)  (b)  (c)  (d) 

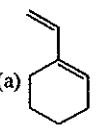
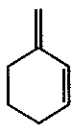
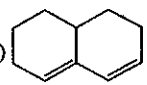
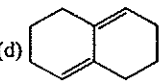
49. In the reaction,



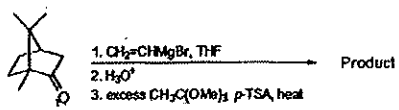
the major product [X] is:

(a)  (b)  (c)  (d) 

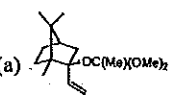
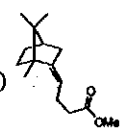
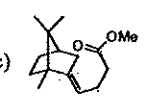
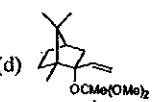
50. The diene which undergoes Diels-Alder reaction with maleic anhydride is **[GATE 2011]**

(a)  (b)  (c)  (d) 

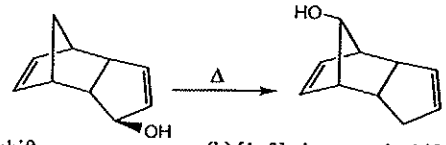
51. In the reaction given below, identify the product **[GATE 2012]**



(p-TSA = p-toluenesulfonic acid; THF = tetrahydrofuran)

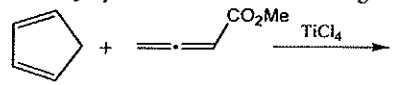
(a)  (b)  (c)  (d) 

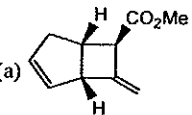
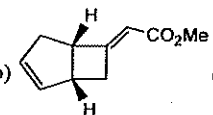
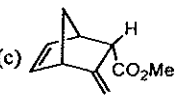
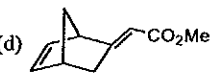
52. The pericyclic reaction given below is an example of **[GATE 2013]**



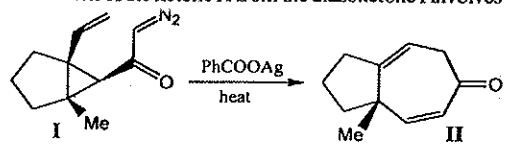
(a) [1, 3]-sigmatropic shift
(b) [1, 5]-sigmatropic shift
(c) [3, 5]-sigmatropic shift
(d) [3, 3]-sigmatropic shift.

53. The major product formed in the following reaction is **[GATE 2014]**



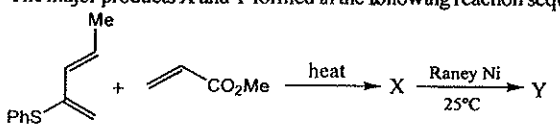
(a)  (b)  (c)  (d) 

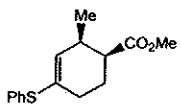
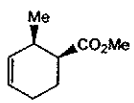
54. Formation of the ketone H from the diazoketone I involves **[GATE 2014]**

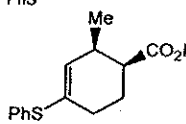
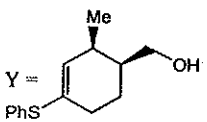


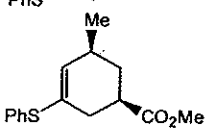
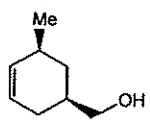
(a) generation of carbene and a [2, 3]-sigmatropic rearrangement
(b) generation of carbene and an electrocyclic ring closing reaction
(c) generation of ketene and a [2+2] cycloaddition
(d) generation of ketene and a [3, 3]sigmatropic rearrangement

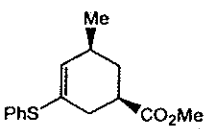
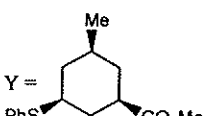
55. The major products X and Y formed in the following reaction sequence are **[GATE 2014]**



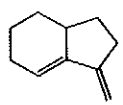
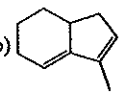
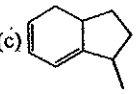
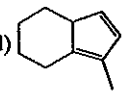
(a) X =  Y = 

(b) X =  Y = 

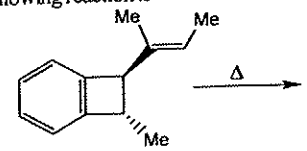
(c) X =  Y = 

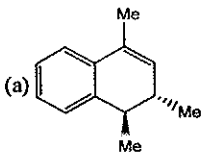
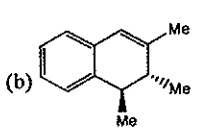
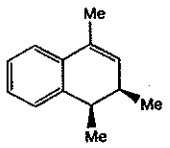
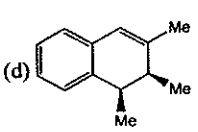
(d) X =  Y = 

56. Amongst the following the compound that **DOES NOT** act as a diene in Diels-Alder reaction is

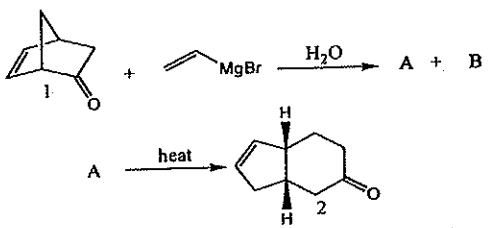
(a)  (b)  (c)  (d)  **[GATE 2015]**

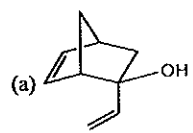
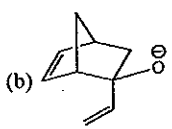
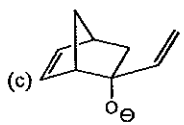
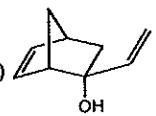
57. The major product formed in the following reaction is **[GATE 2015]**



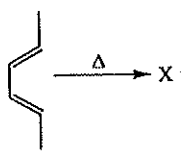
(a)  (b)  (c)  (d) 

58. Compound 1 reacts with vinyl Grignard reagent to give two compounds A and B after hydrolysis. A gives compound 2 upon heating. Predict the structure of A. **[TIFR]**



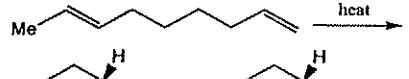
(a)  (b)  (c)  (d) 

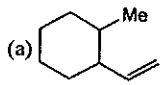
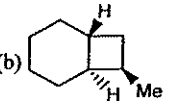
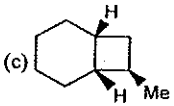
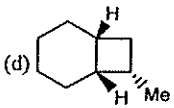
59. What is the product of the following electrocyclic ring-closing reaction? **[TIFR]**



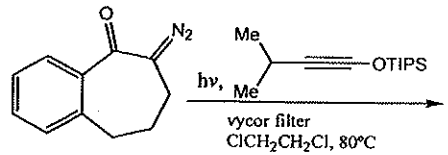
(a)  (b)  (c) both (a) and (b) (d) none of the above

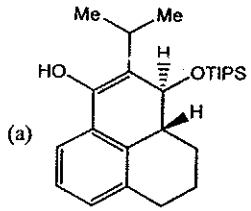
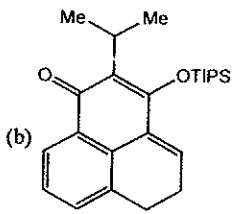
60. The major product formed in the following reaction is **[NET June 2015]**

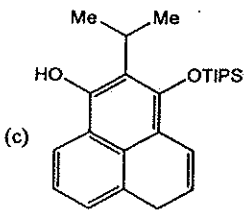
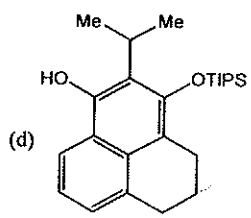


(a)  (b)  (c)  (d) 

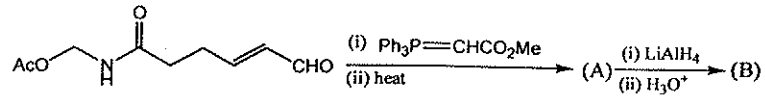
61. The major product in the following reaction sequence is **[NET June 2015]**

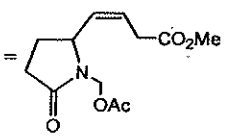
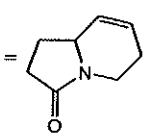


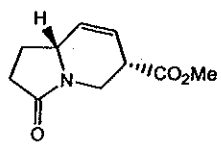
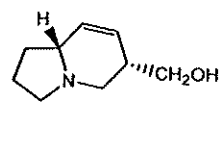
(a)  (b) 

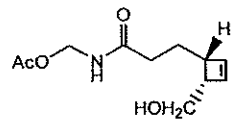
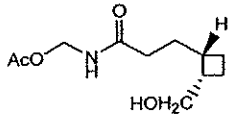
(c)  (d) 

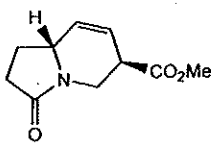
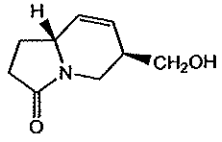
62. Structures of A and B in the following synthetic sequence are **[NET June 2015]**



(a) A =  B = 

(b) A =  B = 

(c) A =  B = 

(d) A =  B = 

CSIR-UGC-NET/JRF|GATE-CHEMISTRY

PERICYCLIC REACTIONS

[NET-JRF| GATE | TIFR- Previous Years' Question]

1. (c)	2. (b)	3. (c)	4. (a)	5. ( )	6. (b)	7. (b)
8. (c)	9. (a)	10. (c)	11. (a)	12. (c)	13. (a)	14. (a)
15. (a)	16. (a)	17. (c)	18. (d)	19. (c)	20. (b)	21. (b)
22. (b)	23. (d)	24. (c)	25. (b)	26. (b)	27. (a)	28. (d)
29. (c)	30. (a)	31. (d)	32. (b)	33. (c)	34. (b)	35. (a)
36. (c)	37. ( )	38. ( )	39. ( )	40. (d)	41. (a)	42. (a)
43. (a)	44. (b)	45. (b)	46. (b)	47. ( )	48. (a)	49. ( )
50. (a)	51. (c)	52. (d)	53. (c)	54. (d)	55. (a)	56. (b)
57. (b)	58.(d)	59. (a)				

Jia Sarai : 28-A/11, Jia Sarai, Near-IIT, New Delhi-16, Ph : 011-26851008, 26861009 www.careerendeavour.com
GTB Nagar : 35, First Floor, Mall Road, G.T.B. Nagar (Opp. Metro Gate No. 3), Delhi-09, Ph: 011-65462244, 27241845

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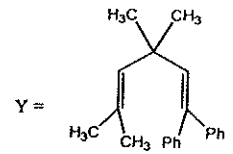
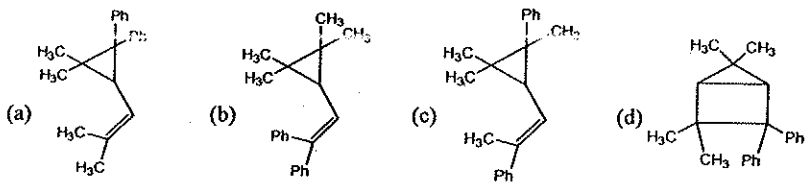
CSIR-UGC-NET/JRF|GATE CHEMISTRY

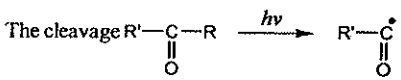
Assignment - PHOTOHEMISTRY

1. The product in the photolysis of Y is:

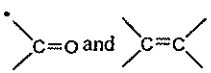
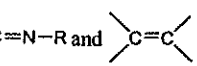
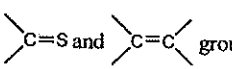




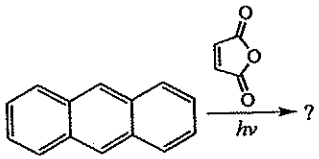
2. o-Methylbenzophenone does not readily undergo photoreduction when irradiated in isopropyl alcohol because
   (a) It does not undergo photoexcitation
   (b) Of photoenolization
   (c) The reduction potential is higher than that of acetone
   (d) Of stereic hindrance of the ortho methyl group.

3. The cleavage  is called
   (a) Norrish type I (b) Norrish type II (c) Beta-cleavage (d) Grob fragmentation

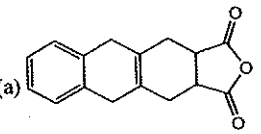
4. During the photolysis of ketones in Norrish type II cleavage.
   (a) A homolytic fission leads to the formation of a radical intermediate.
   (b) CO is produced
   (c) Photoexcited carbonyl group abstracts a gamma hydrogen in the primary step
   (d) Radical formed dimerize.

5. The photochemical paterno-Buchi reaction is a cycloaddition between
   (a) Two  groups.
   (b) A  groups.
   (c) A  groups.
   (d) A  groups.

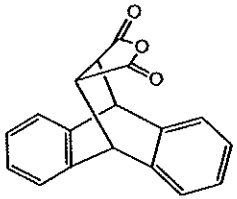
6.



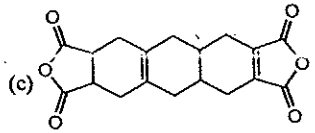
(a)



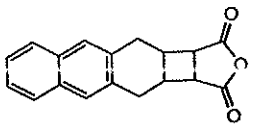
(b)



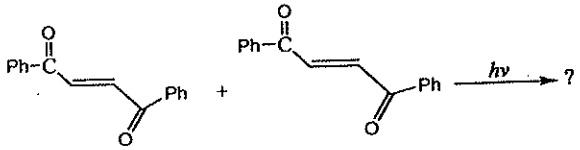
(c)



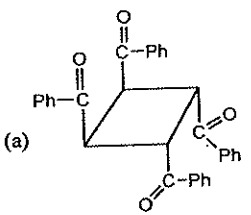
(d)



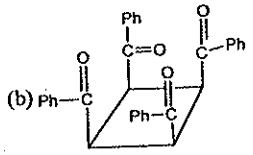
7. The major product fomed by the given reaction is:



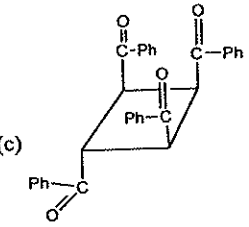
(a)



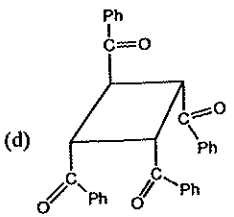
(b)



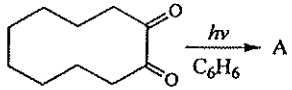
(c)



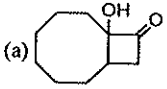
(d)



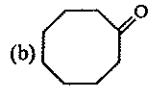
8. The major product (A) is:



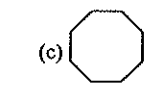
(a)



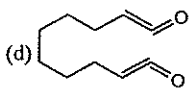
(b)



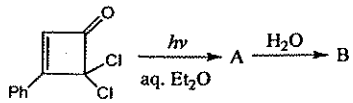
(c)



(d)

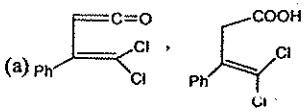


9.

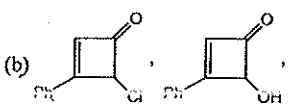


A and B are respectively.

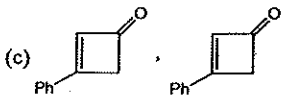
(a)



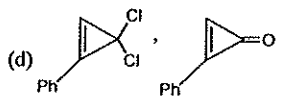
(b)



(c)



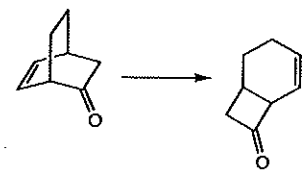
(d)



10. Laser induced fluorescence is a powerful technique to monitor chemical species that fluorescence. The absorption maximum for a given molecule is at 420 nm. The fluorescence maximum for this molecule could be at:

(a) 23809 cm^{-1} (b) 22000 cm^{-1} (c) 26000 cm^{-1} (d) 2381 cm^{-1}

11. The most suitable method for accomplishing the following conversion is:



(a) hν (b) Δ (d) AIBN (d) H^+.

12. Phosphorescence is a slower process than fluorescence because
(a) Phosphorescence occurs at longer wavelengths than fluorescence
(b) Spin angular momentum is not conserved in phosphorescence process
(c) Both (a) and (b)
(d) None of the above.

ANSWER KEY

1. (a)	2. (d)	3. (a)	4. (c)	5. (b)	6. (b)	7. (a)
8. (a)	9. (a)	10. (a)	11. (a)	12. (b)		

CSIR-UGC-NET/JRF|GATE-CHEMISTRY

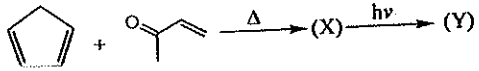
PHOTOCHEMISTRY

[NET-JRF] GATE | TIFR- Previous Years' Question]

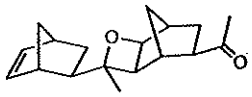
1. The conversion of excited singlet state (S_1) of a molecule to triplet state (T_1) is known as **[NET June 2011]**

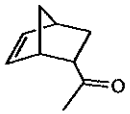
(a) fluorescence (b) phosphorescence (c) intersystem crossing (d) internal conversion

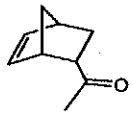
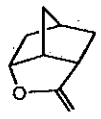
2. The structures of the major products X and Y in the following transformation are **[NET June 2011]**



(a) X =  Y = 

(b) X =  Y = 

(c) X =  Y = 

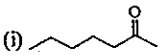
(d) X =  Y = 

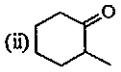
[NET June 2011]

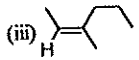
3. Thermolysis of allyl phenyl ether generates
(a) o-allylphenol only
(b) o- and p-allylphenols
(c) o-, m- and p-allylphenols
(d) m-allylphenol only.

4. Match the following starting compounds with corresponding products in photochemical reactions: **[NET Dec. 2011]**

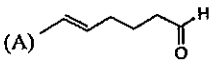
Starting material

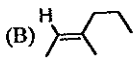
(i) 

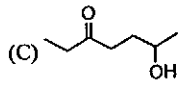
(ii) 

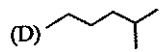
(iii) 

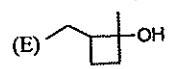
Products

(A) 

(B) 

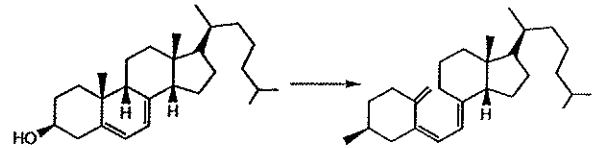
(C) 

(D) 

(E) 

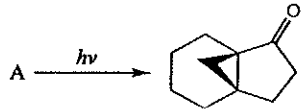
(a) (i)–(E) (ii)–(A) (iii)–(B)
(b) (i)–(A) (ii)–(C) (iii)–(b)
(c) (i)–(D) (ii)–(C) (iii)–(A)
(d) (i)–(E) (ii)–(A) (iii)–(D)

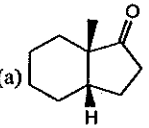
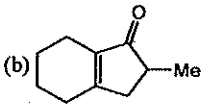
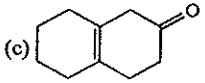
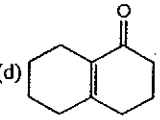
5. The two step conversion of 7-dehydrocholesterol to vitamin D_3 proceeds through **[NET June 2012]**



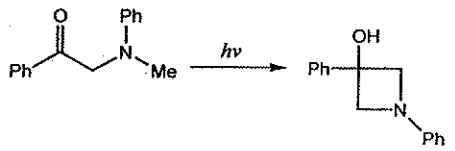
(a) Photochemical electrocyclic disrotatory ring opening; and thermal antarafacial [1, 7]-H shift.
(b) Photochemical electrocyclic conrotatory ring opening; and thermal antarafacial [1, 7]-H shift.
(c) Thermal electrocyclic conrotatory ring opening; and photochemical superafacial [1, 7]-H shift.
(d) Thermal electrocyclic disrotatory ring opening; and thermal suprafacial [1, 7]-H shift.

6. Structure of the starting material A in the following photochemical Norrish reaction, is **[NET June 2012]**



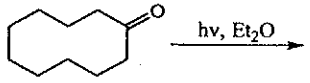
(a)  (b)  (c)  (d) 

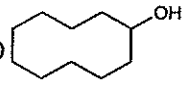
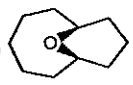
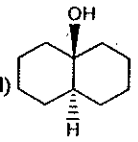
7. The following photochemical transformation proceeds through **[NET Dec. 2012]**



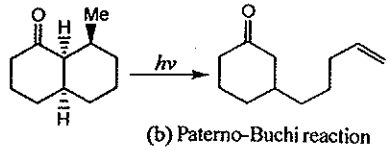
(a) Norrish type I reaction
(b) Norrish type II reaction
(c) Barton reaction
(d) Paterno-Buchi reaction

8. The major product formed in the following reaction is **[NET June 2013]**



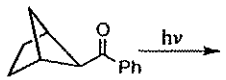
(a)  (b)  (c)  (d) 

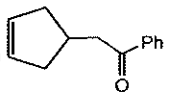
9. The following photochemical conversion proceeds through **[NET June 2012]**

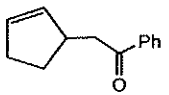


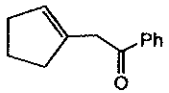
(a) Barton reaction
(b) Paterno-Buchi reaction
(c) Norrish type I reaction
(d) Norrish type II reaction

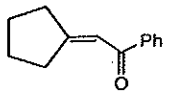
10. The major product formed in the following photochemical reaction is **[NET Dec. 2013]**



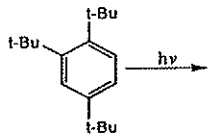
(a) 

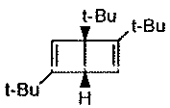
(b) 

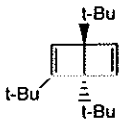
(c) 

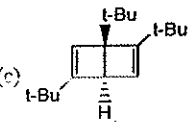
(d) 

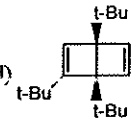
11. The major product formed in the following photochemical reaction is **[NET June 2014]**



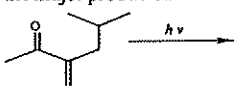
(a) 

(b) 

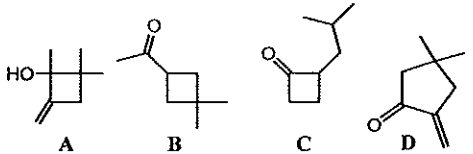
(c) 

(d) 

12. Amongst the following, the major products formed in the following photochemical reactions are



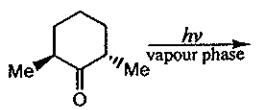
[NET June 2014]



A **B** **C** **D**

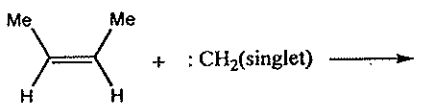
(a) A and C (b) B and C (c) A and D (d) A and B

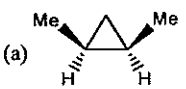
13. The cyclic product(s) of the following photochemical reaction is(are) **[NET Dec. 2014]**

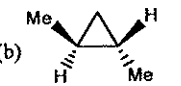


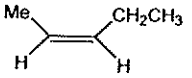
(a) only *cis*-1, 2-dimethylcyclopentane
(b) only *trans*-1, 2-dimethylcyclopentane
(c) a mixture of *cis*- and *trans*-1, 2-dimethylcyclopentanes
(d) only 2, 6-dimethylcyclohexanol

14. The major product formed in the following reaction is: **[GATE 2000]**

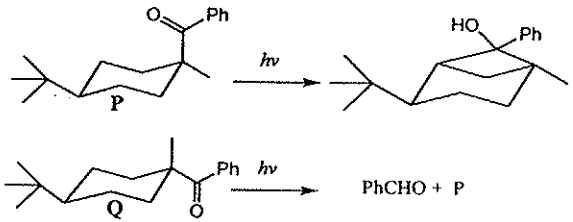


(a) 

(b) 

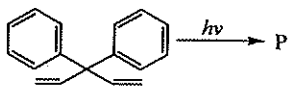
(c) 50 : 50 mixture of above two compounds (d) 

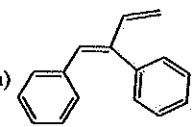
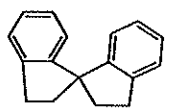
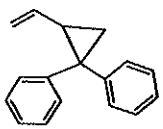
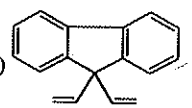
15. The correct description of the following two reactions is that **[GATE 2003]**



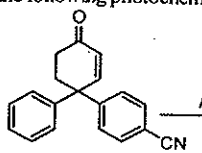
(a) Both P and Q undergo α-cleavage reaction
(b) P undergoes only Norrish type II reaction whereas Q undergoes only Norrish type I reaction.
(c) Q gives P by photochemical chair to chair interconversion of the cyclohexane Ring
(d) Both P and Q undergo Norrish type I reaction, but only Q gives S through this mechanism.

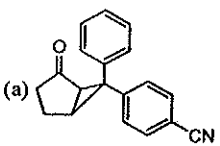
16. The major product P formed in the following photochemical reaction is: **[GATE 2004]**

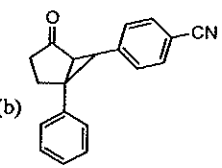


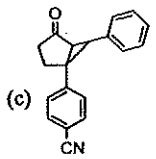
(a) 
(b) 
(c) 
(d) 

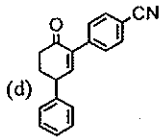
17. The major product P formed in the following photochemical reaction is: **[GATE 2004]**



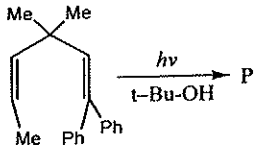
(a) 

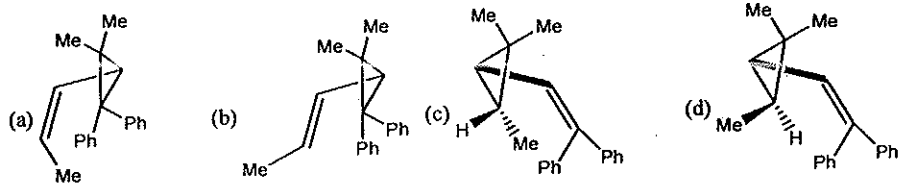
(b) 

(c) 

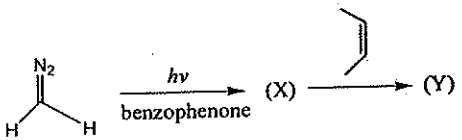
(d) 

18. Identify the major product P in the following reaction. **[GATE 2006]**



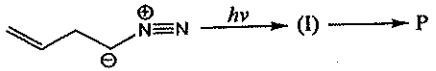


19. In the following reaction **[GATE 2008]**



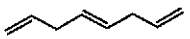
(X) and (Y) respectively are
(a) 1; CH_2 and cis 1, 2-dimethylcyclopropane.
(b) 3; CH_2 and cis 1, 2-dimethylcyclopropane.
(c) 1; CH_2 and a mixture of cis/trans 1, 2-dimethylcyclopropane.
(d) 3; CH_2 and a mixture of cis/trans 1, 2-dimethylcyclopropane.

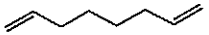
20. In the following reaction **[GATE 2008]**

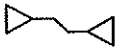


The reactive intermediate I and the product P are

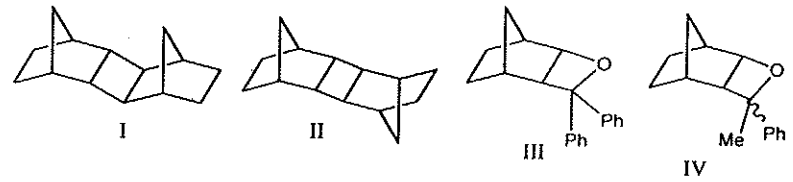
(a) carbene and 

(b) radical and 

(c) carbene and 

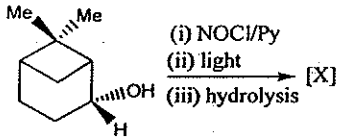
(d) radical and 

21. Identify the major product P and Q in the following reactions from the list of compounds I to IV. **[GATE 2006]**

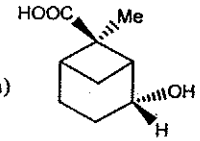


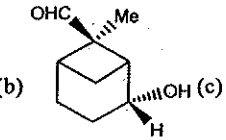
(a) P:I and Q:II (b) P:II and Q:III (c) P:IV and Q:II (d) P:IV and Q: III

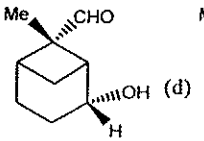
22. In the following reaction sequence **[GATE 2010]**

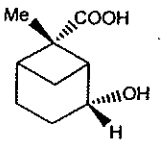


the major product [X] is

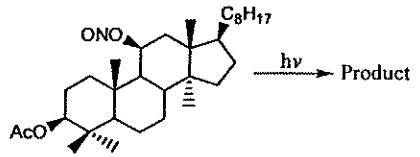
(a) 

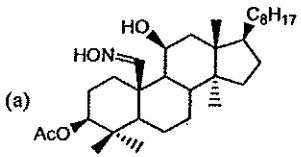
(b) 

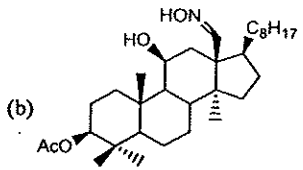
(c) 

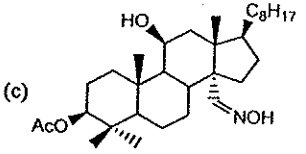
(d) 

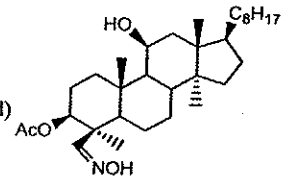
23. The product from the following reaction is **[GATE 2012]**



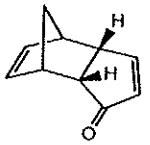
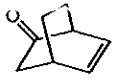
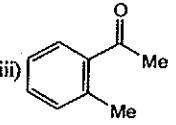
(a) 

(b) 

(c) 

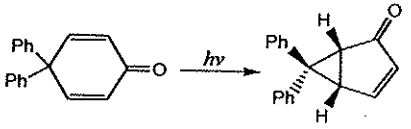
(d) 

24. Match the compounds in the Column-I with photochemical reactions that they can undergo given in the Column-II: **[GATE 2013]**

Column-I	Column-II
(i) 	(p) oxa-di-π-methane rearrangement
(ii) 	(q) Paterno-Buchi reaction
(iii) 	(r) intramolecular [2+2]-cycloaddition.

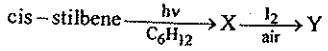
(a) (i)-(q); (ii)-(s); (iii)-(p) (b) (i)-(r); (ii)-(p); (iii)-(s)
(c) (i)-(p); (ii)-(r); (iii)-(q) (d) (i)-(r); (ii)-(q); (iii)-(s)

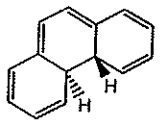
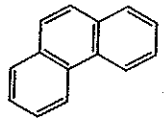
25. Formation of the product in the following photochemical reaction involves **[GATE 2014]**

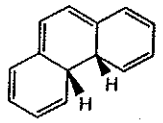
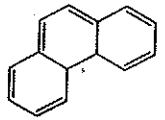


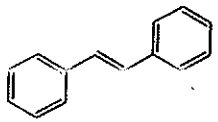
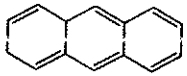
(a) di-π-methane rearrangement (b) Paterno-Buchi reaction
(c) [2, 3]-sigmatropic rearrangement (d) Norrish type I reaction

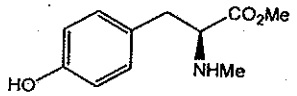
26. The major product X and Y formed in the following reaction sequence are **[GATE 2014]**

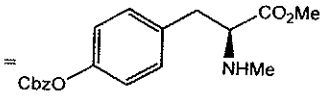


(a) X =  Y = 

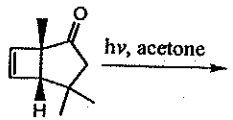
(b) X =  Y = 

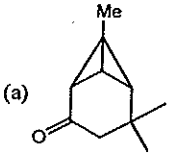
(c) X =  Y = 

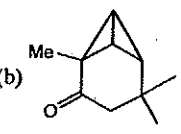
(d) X = 

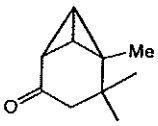
Y = 

27. The major product formed in the following reaction is **[NET June 2015]**



(a) 

(b) 

(c) 

(d)