1. The anticancer drug illustrated below:

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer

2. The drug illustrated below:

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer

3. The drug illustrated below:

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer
4. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="" alt="Chemical Structure" /></td>
<td>is used to treat amebiasis.</td>
<td>is an antifungal agent.</td>
<td>Inhibits the synthesis of ergosterol.</td>
</tr>
</tbody>
</table>

a. I only  
b. III only  
c. I and II only  
d. II and III only  
e. I, II, and III  

**Answer: _______**

5. The drug illustrated below is:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="" alt="Chemical Structure" /></td>
<td>is commonly used with cyclophosphoramide to prevent hemorrhagic cystitis.</td>
<td>is administered iv.</td>
<td>is used with cisplatin to prevent nephrotoxicity.</td>
</tr>
</tbody>
</table>

a. I only  
b. III only  
c. I and II only  
d. II and III only  
e. I, II, and III  

**Answer: _______**

6. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="" alt="Chemical Structure" /></td>
<td>is β-lactamase resistant.</td>
<td>is orally active.</td>
<td>inhibits protein synthesis in bacteria.</td>
</tr>
</tbody>
</table>

a. I only  
b. III only  
c. I and II only  
d. II and III only  
e. I, II, and III  

**Answer: _______**

7. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="" alt="Chemical Structure" /></td>
<td>is used to inhibit C-14 demethylase activity in fungi.</td>
<td>blocks estrogen receptors.</td>
<td>is an aromatase inhibitor.</td>
</tr>
</tbody>
</table>

a. I only  
b. III only  
c. I and II only  
d. II and III only  
e. I, II, and III  

**Answer: _______**
8. The drug illustrated below:

<table>
<thead>
<tr>
<th>Formula</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Chemical Structure" /></td>
<td>is a mitotic spindle poison.</td>
<td>is a prodrug.</td>
<td>is classified as an alkylating agent.</td>
</tr>
</tbody>
</table>

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

Answer: ______

9. The drug illustrated below:

<table>
<thead>
<tr>
<th>Formula</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2" alt="Chemical Structure" /></td>
<td>inhibits mycolic acids synthesis essential to the cell wall of mycobacteria.</td>
<td>irreversibly inhibits thymidylate synthetase.</td>
<td>inhibits dihydrofolate reductase in bacteria.</td>
</tr>
</tbody>
</table>

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

Answer: ______

10. The drug illustrated below:

<table>
<thead>
<tr>
<th>Formula</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Chemical Structure" /></td>
<td>inhibits 5α-reductase, the enzyme which reduces testosterone to 5α-dihydrotestosterone.</td>
<td>has been used to treat prostate cancer.</td>
<td>blocks androgenic receptors.</td>
</tr>
</tbody>
</table>

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

Answer: ______

11. The drug illustrated below:

<table>
<thead>
<tr>
<th>Formula</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Chemical Structure" /></td>
<td>is susceptible to the development of viral resistance.</td>
<td>is NOT cross-resistant with nucleoside reverse transcriptase inhibitors.</td>
<td>is a non-competitive inhibitor of reverse transcriptase.</td>
</tr>
</tbody>
</table>

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

Answer: ______
12. The drug illustrated below:

- **I** inhibits dihydrofolate reductase.
- **II** inhibits DNA synthesis by limiting the DeNovo synthesis of thymidine.
- **III** is leucovorin and is used in “rescue therapy”.

   a) I only
   b) III only
   c) I and II only
   d) II and III only
   e) I, II, and III

   **Answer**

13. The drug illustrated below:

- **I** can only be administered by injection.
- **II** is β-lactamase resistant.
- **III** is a cephalosporin.

   a) I only
   b) III only
   c) I and II only
   d) II and III only
   e) I, II, and III

   **Answer**

14. The drug illustrated below:

- **I** is used to treat tuberculosis.
- **II** is administered orally.
- **III** binds to DNA and produces hydroxy radicals that cause DNA strand breaks.

   a) I only
   b) III only
   c) I and II only
   d) II and III only
   e) I, II, and III

   **Answer**
15. The drug illustrated below:

- **I** ultimately can get incorporated into viral DNA.
- **II** does cause chain termination of developing viral DNA.
- **III** is effective against RNA-containing viruses.

- a) I only
- b) III only
- c) I and II only
- d) II and III only
- e) I, II, and III  **Answer**

16. The drug illustrated below:

- **I** is a bifunctional alkylating agent.
- **II** causes severe nephrotoxicity, which is its dose-limiting side effect.
- **III** primarily causes the cross-linking of the two strands of helical DNA.

- a) I only
- b) III only
- c) I and II only
- d) II and III only
- e) I, II, and III  **Answer**

17. The drug illustrated below is:

- **I** is a bacterial protein synthesis inhibitor.
- **II** is active orally.
- **III** is β-lactamase resistant.

- a) I only
- b) III only
- c) I and II only
- d) II and III only
- e) I, II, and III  **Answer**

18. The drug illustrated below:

- **I** is used topically for its antiinflammatory properties.
- **II** is a glucocorticoid.
- **III** is used in the treatment of various lymphomas.

- a) I only
- b) III only
- c) I and II only
- d) II and III only
- e) I, II, and III  **Answer**
19. The drug illustrated below:

I require hydrolysis but not metabolic oxidation for its antitumor activity.
II is a bifunctional alkylating agent.
III can cause hemorrhagic cystitis as a side effect.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

20. The drug illustrated below:

I is administered iv only.
II requires activation by HPGRT (salvage pathway).
III is a prodrug that is converted to 5-FU.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

21. The drug illustrated below:

I initially blocks protein synthesis in bacteria.
II is β-lactamase resistant.
III targets DNA gyrase causing double strand breaks to bacterial DNA.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

22. The drug illustrated below:

I requires metabolic activation.
II is a monofunctional alkylating agent.
III is used to treat tuberculosis.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer
23. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I has been used to treat hair loss (alopecia) in males.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II has been used to treat prostate cancer.</td>
</tr>
<tr>
<td></td>
<td>III is an antagonist at 5-α-dihydrotestosterone receptors.</td>
</tr>
<tr>
<td>a</td>
<td>I only</td>
</tr>
<tr>
<td>b</td>
<td>III only</td>
</tr>
<tr>
<td>c</td>
<td>I and II only</td>
</tr>
<tr>
<td>d</td>
<td>II and III only</td>
</tr>
<tr>
<td>e</td>
<td>I, II, and III</td>
</tr>
</tbody>
</table>

Answer ______

24. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I is orally active.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II is a monobactam.</td>
</tr>
<tr>
<td></td>
<td>III is β-lactamase resistant.</td>
</tr>
<tr>
<td>a</td>
<td>I only</td>
</tr>
<tr>
<td>b</td>
<td>III only</td>
</tr>
<tr>
<td>c</td>
<td>I and II only</td>
</tr>
<tr>
<td>d</td>
<td>II and III only</td>
</tr>
<tr>
<td>e</td>
<td>I, II, and III</td>
</tr>
</tbody>
</table>

Answer ______

25. The drug illustrated below is:

<table>
<thead>
<tr>
<th></th>
<th>I an inhibitor of mycobacterial arabinosyl transferases.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II used together with other agents in the treatment tuberculosis.</td>
</tr>
<tr>
<td></td>
<td>III used with doxorubicin to prevent cardiotoxicity.</td>
</tr>
<tr>
<td>a</td>
<td>I only</td>
</tr>
<tr>
<td>b</td>
<td>III only</td>
</tr>
<tr>
<td>c</td>
<td>I and II only</td>
</tr>
<tr>
<td>d</td>
<td>II and III only</td>
</tr>
<tr>
<td>e</td>
<td>I, II, and III</td>
</tr>
</tbody>
</table>

Answer ______

26. The drug illustrated below is:

<table>
<thead>
<tr>
<th></th>
<th>I a potent mineralocorticoid.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>II can be administered orally</td>
</tr>
<tr>
<td></td>
<td>III does have some glucocorticoid activity.</td>
</tr>
<tr>
<td>a</td>
<td>I only</td>
</tr>
<tr>
<td>b</td>
<td>III only</td>
</tr>
<tr>
<td>c</td>
<td>I and II only</td>
</tr>
<tr>
<td>d</td>
<td>II and III only</td>
</tr>
<tr>
<td>e</td>
<td>I, II, and III</td>
</tr>
</tbody>
</table>

Answer ______
27. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>acts by targeting topoisomerase II.</td>
<td>is known to exhibit cardiac toxicity.</td>
<td>extravasation of this agent is associated with severe necrosis at the site of infusion.</td>
</tr>
</tbody>
</table>

a  I only  
b  III only  
c  I and II only  
d  II and III only  
e  I, II, and III  

**Answer**

28. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inhibits viral DNA polymerase.</td>
<td>is a 2’deoxyguanosine mimic.</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>III</td>
</tr>
</tbody>
</table>

a  I only  
b  III only  
c  I and II only  
d  II and III only  
e  I, II, and III  

**Answer**

29. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>is a non-nucleosides reverse transcriptase inhibitor.</td>
<td>does have antiangiogenic properties.</td>
<td>inhibits multiple receptor tyrosine kinases.</td>
</tr>
</tbody>
</table>

a  I only  
b  III only  
c  I and II only  
d  II and III only  
e  I, II, and III  

**Answer**

30. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inhibits 14α-demethylase in the biosynthesis of ergosterol.</td>
<td>is primarily, if not exclusively, used topically.</td>
<td>inhibits squalene exopoxidase.</td>
</tr>
</tbody>
</table>

a  I only  
b  III only  
c  I and II only  
d  II and III only  
e  I, II, and III  

**Answer**
31. For the drug illustrated below:

![Drug Structure]

I cross-allergenicity could occur in individuals allergic to sulfonamide antibiotics.
II it is used only in combination with ritonavir to achieve sufficient plasma concentrations.
III is a HIV protease inhibitor.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

32. The drug illustrated below is:

![Drug Structure]

I a highly effective Gram (-) antibiotic.
II orally active.
III a β-lactamase inhibitor.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

33. The drug illustrated below:

![Drug Structure]

I is administered orally.
II inhibits ribonucleotide diphosphate reductase.
III is used a sensitizing agent in radiotherapy.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer

34. **Cetuximab, Erbitux**

I is a monoclonal antibody that binds to the receptor for epithelial growth factor.
II is an anti-angiogenic agent.
III is a monoclonal antibody that binds to vascular endothelial growth factor.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III

Answer
34. The drug illustrated below:

I acts as a mitotic spindle poison by inhibiting the disassembly of microtubules.
II if formulated with cremophor EL, can be administered orally.
III acts as a mitotic spindle poison by destabilizing microtubules and promoting their dissolution.

a) I only
b) III only
c) I and II only
d) II and III only
e) I, II, and III

Answer: 

36. The drug illustrated below:

I can be used as progesterone agonist.
II can be administered orally.
III is used as an abortifacient with a PGE₂prostaglandin.

a) I only
b) III only
c) I and II only
d) II and III only
e) I, II, and III

Answer: 

37. The drug illustrated below is:

I is incorporated into viral DNA.
II is a pro-drug.
III is a thymidine “mimic”.

a) I only
b) III only
c) I and II only
d) II and III only
e) I, II, and III

Answer: 

38. The drug illustrated below:

I is not cross allergenic with penicillin antibiotics.
II forms a ketal intermediate at low pH that is associated with stomach cramping.
III is acid labile and tablets need to be enteric coated.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III  Answer

39. Chronic Myelogenous Leukemia (CML)

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>is uncontrolled growth of B- or T-lymphocytes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>can often be treated effectively with the tyrosine kinase inhibitor Imatinib mesylate (Gleevec)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>is the uncontrolled growth of granulocytes.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III  Answer

40. The drug illustrated below:

I is used to prevent hair loss.
II is a metabolite of estrogen..
III is the most potent androgenic metabolite of testosterone

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III  Answer

41. The drug illustrated below is:

I used to prevent hemorrhagic cystitis associated with the administration of cyclophosphoramide or ifosfamide.
II activated by alkaline phosphatase.
III used to prevent renal toxicity associated with the administration of cisplatin.

a  I only
b  III only
c  I and II only
d  II and III only
e  I, II, and III  Answer
42. The drug illustrated below:

- **I** has an anabolic:androgenic ratio of 3:1.
- **II** is an orally active synthetic estrogen.
- **III** is an aromatase inhibitor.

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

**Answer**

43. The drug illustrated below:

- **I** is a glucocorticoid.  
- **II** is used as an inhalant in the treatment of asthma.  
- **III** is used as an abortifacient.

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

**Answer**

44. The drug illustrated below:

**Trastuzumab, Herceptin**

- **I** is a monoclonal antibody for the treatment of Herpes viral infection.  
- **II** is used in the treatment of non-Hodgkin’s lymphoma that possess the membrane bound phosphoprotein, CD-20.  
- **III** is a monoclonal antibody used to treat metastatic breast cancers that overexpress human epidermal growth factor 2.

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

**Answer**

45. BCG instillation

- **I** refers to the administration of bleomycin together with cyclophosphoramide and gemcitibine into the urinary bladder.  
- **II** is used for the treatment of superficial bladder tumors.  
- **III** refers to the administration of an inactivated form of the bacterium Mycobacterium tuberculosis into the urinary bladder.

a) I only  
b) III only  
c) I and II only  
d) II and III only  
e) I, II, and III  

**Answer**
46. The drug illustrated below is:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inhibits squalene epoxidase in the synthesis of ergosterol.</td>
<td>is not used orally, but is effective topically for Tinea infections.</td>
<td>inhibits 14α-demethylase in the biosynthesis of ergosterol.</td>
</tr>
</tbody>
</table>

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer: _____

47. The drug illustrated below is:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>primarily used to treat tuberculosis.</td>
<td>selectively binds to ergosterol.</td>
<td>primarily used as an antifungal agent.</td>
</tr>
</tbody>
</table>

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer: _____

48. The drug illustrated below:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>targets topoisomerase II converting this enzyme into a cellular poison.</td>
<td>can discolor and retard growth of developing teeth in children.</td>
<td>can be administered orally.</td>
</tr>
</tbody>
</table>

| a | I only |
| b | III only |
| c | I and II only |
| d | II and III only |
| e | I, II, and III |

Answer: _____
49. The drug illustrated below:

**I** is used in combination with nucleoside reverse transcriptase inhibitors that mimic thymidine or 2’-deoxycytosine.

**II** must be converted to a 5’-triphosphate to be active.

**III** is metabolically converted to a mimic of 2’-deoxyadenosine.

- **a** I only
- **b** III only
- **c** I and II only
- **d** II and III only
- **e** I, II, and III

**Answer**

50. The drug illustrated below:

**I** inhibits DNA polymerase, while increasing RNA polymerase.

**II** stabilizes the cleaved complex formed between a topoisomerase enzyme and DNA.

**III** can be administered orally.

- **a** I only
- **b** III only
- **c** I and II only
- **d** II and III only
- **e** I, II, and III

**Answer**

---

**Part 2 Generic Names (9 Points).** Provide the Generic Names for the Compounds listed on the following page. In the space provided under the structure of each the compounds illustrated, write the correct CAPITALIZED letter corresponding to the choice of answers given on the bottom of the page. The letter “Z” may be used as an answer as seldom or as often as needed.
A. Cyclophosphamide

B. Doxorubicin

C. Chloramphenicol

D. Cidofovir

E. Famciclovir

F. Tobramycin

G. Cephalexin

H. Moxifloxacin

I. Sulfamethoxazole

J. Progesterone

K. Estrone

L. Amoxicillin

M. Aldosterone

N. Finasteride

O. Ertapenem

P. Voriconazole

Q. Terbinafine

R. Ritonavir

S. Mitoxanthrone

T. Betamethasone

U. Ribavirin

V. Cytarabine

W. Pyrimethamine

X. Piperacillin

Y. Clavulanic Acid

Z. None of These
Part 3 Nomenclature 16 Points.
When using the basic templates provided insert all unsaturation as required and specify the orientation of all functionality or hydrogen atoms by using BOLD lines/wedges or HASHED lines/wedges.

Example

1. \[17\beta\text{-Hydroxy-1}\alpha\text{-methyl-17-propyl-5-}\alpha\text{-androstan-3-one}\]
   [known as Rosterolone]

2. \[1\text{-Azabicyclo[3.2.0]hept-2-ene-2-carboxylic acid, 3-(3-chlorophenyl)-6-(2-hydroxyethyl)-4-methyl-7-oxo-, 4S-[4\alpha,5\beta,6\beta]-}\]
3. Pregn-1,4-diene-3,20-dione, 6-fluoro-11,17,21-trihydroxy-16-methyl-, (6α,11β,16α)-

4. 3-Quinolinecarboxylic acid, 5-amino-1-cyclopropyl-7-(3,5-dimethyl-1-piperazinyl)-6,8-difluoro-1,4-dihydro-4-oxo-, cis-(Sparfloxacin, Zagan®)