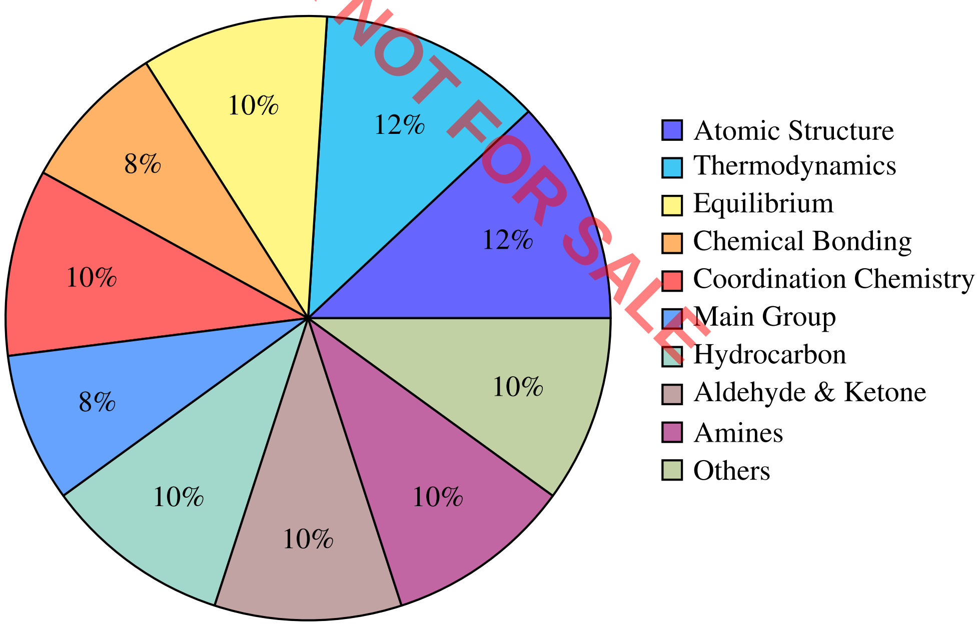
CHEMISTRY

Section	Chapters	17	18	19	20	21	22	23	24
Physical	Atomic Structure	1	-	1	2	1	2	1	1
	Thermodynamics	1	3	1	2	1	2	-	2
	Equilibrium	3	2	1	2	1	2	1	2
	Solution	1	-	1	-	1	-	1	-
	Electrochemistry	-	-	-	1	1	-	2	2
	Chemical Kinetics	-	2	-	1	1	2	1	1
Inorganic	Chemical Bonding	1	-	2	2	2	1	2	1
	Coordination Chemistry	-	1	2	2	1	2	1	3
	Main Group Chemistry	2	2	1	1	1	3	3	1
Organic	Hydrocarbon	3	1	1	1	2	-	2	1
	Alcohol Phenol Ether	-	2	-	1	-	-	1	1
	Haloalkanes	-	-	2	1	1	-	1	-
	Aldehyde Ketone & Carboxylic Acids	-	-	1	2	2	2	1	2
	Amines	1	-	-	-	2	1	-	2



CONTENTS

Mock Tests

Class-wise Tests

Full Syllabus Tests

NEST-2025 PAPER

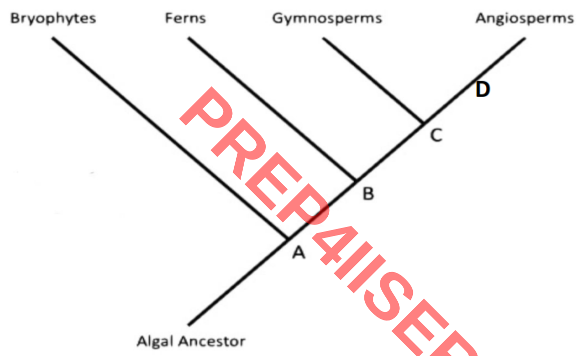
Mock Test 1

Syllabus: Class 11 (Full)	**Marking Scheme**
Duration: 180 Minutes	Correct: +3
Subjects: PCMB	Wrong: -1
Total Questions: 80	Not Attempted: 0
Each Section: 20 Questions	**Evaluation:** Best 3 out of 4 subjects considered.

Best of Luck!

Biology

1. Following is a cladogram showing phylogenetic relationships among a group of plants:



In the above representation, A, B, C and D respectively represent:
(A) Xylem and phloem, embryo, flower, seed.
(B) Embryo, xylem and phloem, seed, flowers.
(C) Embryo, xylem and phloem, flower, seed.
(D) Xylem and phloem, flower, embryo, seed.

2. The process by which an organism influences the evolutionary pace of the other organism is called:
(A) Coevolution (B) Parallel evolution (C) Convergent evolution (D) Divergent evolution

3. The biggest disadvantage of sexual reproduction against the asexual reproduction is:
(A) Only half of the genetic material is passed to offspring from each parent
(B) A lot of energy and time is consumed in locating the mate
(C) At least two individuals are required for sexual reproduction
(D) After fertilization in many cases, the zygote fails to develop

4. Natural selection is primarily based on fitness which is dependent on the maximum number of offspring laid for the next generation but at present, a new concept is added where organisms help in the reproduction of relative to increase the overall fitness. This concept is termed as:
(A) Evolutionary fitness
(B) Inclusive fitness
(C) Relative fitness
(D) Kin selection

5. The major cause of the evolution of genes and proteins is:
(A) Point mutation (B) Chromosomal aberrations (C) Sexual reproduction (D) Gene duplication and divergence

6. Select the incorrect statement from the following:
1. NBRI (National Botanical Research Institute) is situated at Lucknow
2. Plant families like convolvulaceae and solanaceae are included in other polynomials mainly based on floral characters
3. All living organisms – present, past and future are

linked to one another by sharing of common genetic material but to varying degrees
4. Order solanum, datura and petunia are placed in the family solanaceae
(A) 1 only (B) 2 and 4 (C) 4 only (D) 2 and 3

7. Which of the following statements is incorrect?
(A) All plants, animals, fungi and microorganisms exhibit metabolism
(B) Interactions among the molecular components of the organelles result into the properties of cell organelles
(C) Properties of cellular organelles are present in the molecular constituents of the organelles
(D) Cellular organisation of the body is the defining feature of life forms

8. Identify the correct sequence of taxonomic categories:
(A) species → order → kingdom → phylum
(B) order → genus → phylum → species
(C) family → species → class → genus
(D) species → genus → order → phylum

9. Select the incorrect statement from the following:
(A) ICZN stands for international code of zoological nomenclature
(B) Each statement in the key is known as lead
(C) Taxonomic keys are tools that help in identification based on characteristics
(D) Ernst Mayr used Systema Naturae as the title of his Publication

10. Which of the following is a correct statement?
(A) Both the words in a biological name are printed in bold to indicate their latin origin
(B) Biological names are generally in greek
(C) The first word in a biological name represents the specific epithet while the second component denotes this genus
(D) The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter

11. Select the incorrect statements out of the following:
(A) The phylogenetic system of classification takes into account evolutionary relationships among organisms.
(B) Herbarium is a tool to study common characters like local and scientific names of a species.
(C) The static concept of species was given by Carolus Linnaeus.
(D) The sequence of taxonomy is only Identification → Description → Nomenclature.

12. We know that S.L. Miller conducted an experiment to support the theory of chemical evolution. He created a much similar early atmosphere of earth in a flask. Which statements don't support the experiment of Miller out of the following?
(A) He took Hydrogen, methane, ammonia and water vapor at 800°C in the flask for experiment.
(B) He took hydrogen, ammonia and methane in the ratio → 1:2:2.
(C) He obtained simple amino acids like aspartic acid, glycine and alanine.
(D) Very similar constituents were found as of the experiment in various meteorites and old fossilized rocks.

13. There have been many theories regarding the origin of life and its evolution. Select the Incorrect statement about the various theories.
(A) Theory of special creation states that diversity in species seen today was from the beginning and this theory was stated by Father Suarez.
(B) The small spores that enter into the earth's atmosphere through outer space bring life. This statement was based on the theory of catastrophism believed by astronomers and early Greek thinkers.
(C) The theory of abiogenesis was disproved by the experiments of Redi, Spallanzani and Pasteur.
(D) The theory of chemical evolution was the most accepted one by Oparin and Haldane and supported through experiments by Miller.

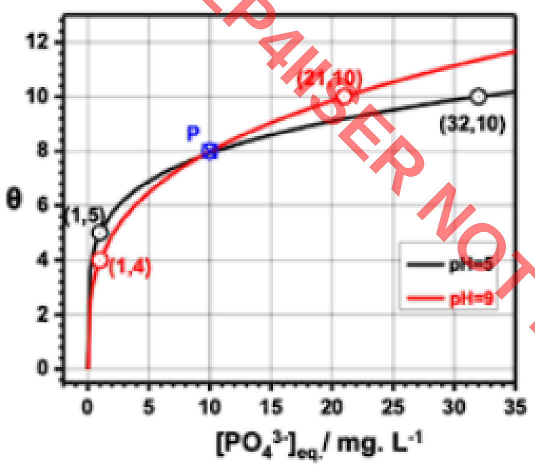
14. Select the correct statements about the features of living and taxonomic features etc. of various organisms.
(A) Growth and Reproduction, both are the defining features of living along with metabolism and consciousness.
(B) Sapindales is the superclass of the genus Mangifera.
(C) Convolvulaceae, Solanaceae and Poaceae all three represent the same order i.e. Polymoniales.
(D) Herbarium contains dead plants.

is(are)
(A) The half-life of the reaction is 15 min
(B) The rate constant (k) is 3.85×10^{-4} s^{-1}
(C) The mass of sucrose hydrolysed in 60 min is 25.6 g
(D) The rate of the reaction at 30 min is 1.625×10^{-5} Ms^{-1}

35. The alcohol that is chiral and can react with acidified dichromate under controlled conditions to give an aldehyde is
(A) 2-ethyl-1-butanol (B) 2-pentanol (C) 2-methyl-1-butanol (D) 2,2-dimethyl-1-butanol

36. Compound X ($C_4H_6OCl_2$) reacts with cold water to form Y ($C_4H_7O_2Cl$). X on heating with KOH and followed by acidification gives Z ($C_4H_8O_3$). X is
(A) $CH_3CCl_2CH_2CHO$
(B) $ClCH_2CH_2CH_2COCl$
(C) $ClCH(CH_3)$-CO-CH_2Cl
(D) CH_2-CH_2-CHCl-COCl

37. The adsorption capacity of $Fe_2O_3 \cdot TiO_2$ composite is shown below. The correct option regarding parameters is



(A) Values of k and n at pH 5 are larger
(B) Values of k and n at pH 9 are larger
(C) At point P, values are same
(D) k larger at pH 5, n larger at pH 9

38. At 25°C, the standard reduction potential for the half-cell reaction is 0.28 V. What is the reduction potential in 10 M $[H^+]$?

$$Zn\,(s) + 2\,H^+\,(aq) \longrightarrow Zn^{2+}\,(aq) + H_2\,(g)$$

(A) 0.339 V (B) 0.870 V (C) 0.398 V (D) 0.290 V

39. The time required for reducing 1 mole of MnO_4^- when a current of 2.5 A is passed is
(A) 53.6 hours (B) 12.9 μs (C) 10.7 hours (D) 64.8 μs

40. The standard electrode potentials are given. The potential $E^0(Fe^{3+}/Fe)$ is
(A) $(2x + y)$ (B) $(x + y)$ (C) $(x + 2y)/3$ (D) $(2x + y)/3$

Mathematics

41. Consider the function $f(x) = x^3 - 3x^2 + 3x - 1$. Which of the following statements is correct?
(A) f(x) is strictly increasing in $(-\infty, 1)$ and strictly decreasing in $(1, \infty)$.
(B) f(x) is strictly decreasing for all real x.
(C) f(x) has a local maximum at x = 1.
(D) f(x) is strictly increasing for all real x.

42. Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} - \hat{k}$. The value of $[\vec{a} + \vec{b} \quad \vec{b} + \vec{c} \quad \vec{c} + \vec{a}]$ is
(A) 0 (B) -8 (C) 8 (D) 16

43. In a certain test, there is a 0.5% chance of a false positive and a 1% chance of a false negative. If 2% of the population actually has the disease, what is the probability that a person actually has the disease given that they tested positive?
(A) ≈ 0.80 (B) ≈ 0.65 (C) ≈ 0.28 (D) ≈ 0.95

44. The value of the integral $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x}\, dx$ is
(A) π^2 (B) $\frac{\pi^2}{2}$ (C) $\frac{\pi^2}{4}$ (D) 0

45. If A is a square matrix of order 3 such that $|A| = -2$, then the value of $|2A \cdot adj(3A)|$ is
(A) -8 (B) -72 (C) -648 (D) -2592

46. The order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + 3\left(\frac{d^2y}{dx^2}\right)^3 + 2\left(\frac{dy}{dx}\right)^4 + y^5 = 0$ are respectively

(A) $3, 2$ (B) $2, 3$ (C) $3, 3$ (D) 3, not defined

47. A random variable X follows a binomial distribution with parameters n and p, such that mean = 4 and variance = 3. The probability $P(X \geq 1)$ is

(A) $1 - \left(\frac{1}{4}\right)^{16}$

(B) $1 - \left(\frac{3}{4}\right)^{16}$

(C) $1 - \left(\frac{1}{4}\right)^{4}$

(D) $1 - \left(\frac{3}{4}\right)^{4}$

48. The distance of the point $(1, 2, 3)$ from the plane $x - 2y + 2z = 10$ measured parallel to the line $\frac{x}{1} = \frac{y-1}{4} = \frac{z+2}{-3}$ is

(A) $\sqrt{26}$ (B) $\frac{1}{\sqrt{26}}$ (C) 1 (D) 5

49. A wire of length 20 cm is cut into two pieces, one of which is bent into a circle and the other into a square. For the combined area of the two figures to be minimum, the length of the piece bent into a circle should be

(A) $\frac{20\pi}{\pi + 4}$

(B) $\frac{20\pi}{\pi + 1}$

(C) $\frac{10\pi}{\pi + 4}$

(D) $\frac{80}{\pi + 4}$

50. If $\tan^{-1}(x) + \tan^{-1}(y) + \tan^{-1}(z) = \pi$, then which of the following is true?

(A) $x + y + z = xyz$

(B) $xy + yz + zx = 1$

(C) $x + y + z = 1 - xyz$

(D) $\frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx} = 1$

51. Let $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$. Which of the following is correct at $x = 0$?

(A) f is continuous but not differentiable.

(B) f is differentiable and $f'(0) = 0$.

(C) f is differentiable and $f'(0) = 1$.

(D) f is not continuous.

52. If the projection of the vector $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ on the vector $\vec{b} = 2\hat{i} + \lambda\hat{k}$ is zero, then the value of λ is

(A) $-\frac{3}{2}$ (B) -1 (C) $\frac{3}{2}$ (D) 2

53. The general solution of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+y-1}$ is

(A) $x + y + \ln|x + y| = c$

(B) $x - y + 2\ln|x + y| = c$

(C) $y - x + 2\ln|x + y| = c$

(D) $y - x + \ln|x + y| = c$

54. The shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$ is

(A) $\frac{1}{\sqrt{6}}$ (B) $\frac{1}{2}$ (C) $\frac{1}{\sqrt{3}}$ (D) 0

55. If a, b, c are non-zero real numbers and the system of equations $y + z = a,\ z + x = b,\ x + y = c$ has a non-trivial solution, then $a + b + c$ must be

(A) 0 (B) 1 (C) abc (D) $ab + bc + ca$

56. The area bounded by the curves $y^2 = 4x$ and $x^2 = 4y$ is

(A) $\frac{8}{3}$ (B) $\frac{16}{3}$ (C) $\frac{32}{3}$ (D) $\frac{4}{3}$

57. A fair die is rolled twice. Let A be the event "sum of numbers on the two rolls is 8" and B be the event "first roll shows a multiple of 3". Then $P(A|B)$ is

(A) $\frac{1}{6}$ (B) $\frac{2}{9}$ (C) $\frac{1}{3}$ (D) $\frac{5}{36}$

58. If $|z - 3i| = 3$ and $\arg(z) = \frac{\pi}{4}$, then z equals

(A) $3 + 3i$

(B) $3\sqrt{2} + 3\sqrt{2}i$

(C) $\frac{3}{\sqrt{2}} + \frac{3}{\sqrt{2}}i$

(D) $\frac{3}{\sqrt{2}} + 3\left(1 + \frac{1}{\sqrt{2}}\right)i$

59. A curve passes through the point (1, 1) and satisfies the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{x}{y}$. The equation of the curve is

(A) $y^2 = x^2(1 + 2\ln x)$

ANSWER KEY

1. A	**2. B**	**3. D**	**4. D**	**5. A**
6. B	**7. B**	**8. A**	**9. C**	**10. A**
11. B	**12. D**	**13. B**	**14. A**	**15. C**
16. A	**17. B**	**18. B**	**19. A**	**20. B**
21. B	**22. B**	**23. C**	**24. D**	**25. B**
26. A	**27. D**	**28. A**	**29. B**	**30. A**
31. A	**32. C**	**33. C**	**34. B**	**35. A**
36. B	**37. A**	**38. C**	**39. B**	**40. B**
41. A	**42. A**	**43. A**	**44. D**	**45. D**
46. C	**47. C**	**48. B**	**49. D**	**50. B**
51. B	**52. C**	**53. C**	**54. C**	**55. D**
56. D	**57. B**	**58. C**	**59. D**	**60. A**
61. B	**62. A**	**63. C**	**64. D**	**65. A**
66. D	**67. D**	**68. A**	**69. C**	**70. C**
71. B	**72. B**	**73. C**	**74. D**	**75. A**
76. A	**77. C**	**78. D**	**79. B**	**80. B**

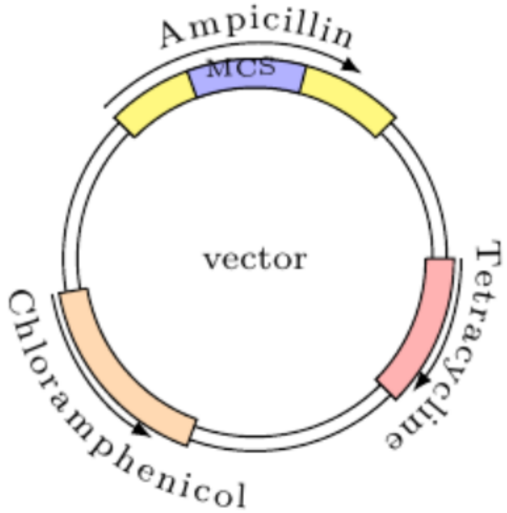
Self-Assessment Key

Subject	**Q. Attempted**	**Correct**	**Wrong**	**Accuracy (%)**
Mock Test 4 (80)				

Total Score

OUT OF 240

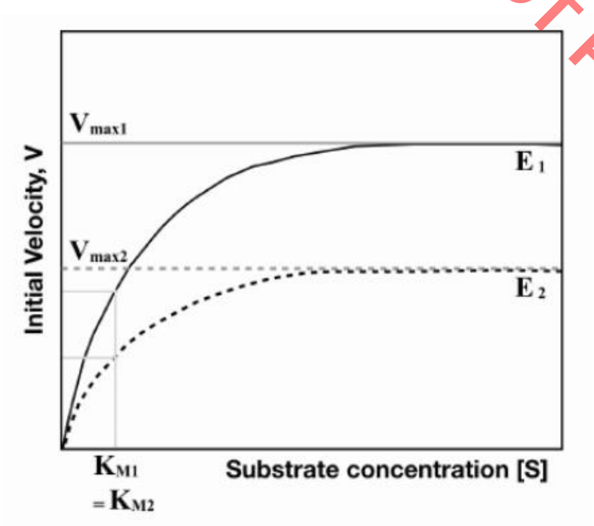
Scan for solutions



(A) Ampicillin, Chloramphenicol, Tetracycline
(B) Chloramphenicol, Tetracycline, Ampicillin
(C) Ampicillin, Tetracycline, Chloramphenicol
(D) Tetracycline, Ampicillin, Chloramphenicol

10. A deer with energy reserves of 150 kJ spends 54 kJ in respiration, while 84 kJ is excreted as feces and urine. Based on this information, the efficiency of energy transfer from the deer eaten by a lion, will be
(A) 8% (B) 10% (C) 92% (D) 20%

11. The graph given below shows the Michaelis-Menten Kinetics for two reactions (R1 and R2; represented as solid and dotted lines, respectively). Enzymes E1 and E2 have V_{max} values, V_{max1} and V_{max2}, respectively. The respective K_m values for E1 and E2 are K_{m1} and K_{m2}. ($K_{m1} = K_{m2}$). The correct statement for reactions R1 and R2 is



(A) E1 and E2 can never be the same enzyme.
(B) E1 and E2 may be the same enzyme, acting on two different substrates with different affinities.
(C) E1 and E2 never represent two different concentrations of the same enzyme, acting on the same substrates.
(D) E1 and E2 may be two different enzymes, with the same affinity for the substrate.

12. In the human colon, *Bacteroides thetaiotaomicron* helps break down complex carbohydrates that humans cannot digest on their own. In return, the bacterium benefits from the nutrients and stable environment. This mutually beneficial relationship is best termed
(A) Commensalism
(B) Amensalism
(C) Mutualism
(D) Parasitism

13. Brassinosteroids (BRs) are plant hormones that promote cell elongation and division. BR binds to the receptor kinase BRI1, initiating a signaling cascade that inactivates the BIN2 kinase. In the absence of BR, BIN2 phosphorylates and inactivates transcription factors BES1/BZR1, preventing expression of BR-responsive genes. When BR is present, BIN2 is inhibited, allowing BES1/BZR1 to enter the nucleus and activate gene expression. Based on this, the correct statement is
(A) Mutation in BES1 gene enhances BR signaling leading to taller plants
(B) In presence of BR, BIN2 phosphorylates BES1 preventing BR responses
(C) BIN2-silenced plants show BR responses even in the absence of BR
(D) Plants mutant for BRI1 receptor show normal growth when BR is applied externally

14. The eyes of octopuses and humans are highly similar in structure and function, including features like a lens, retina, and iris. However, these similarities evolved independently in the two lineages due to similar environmental pressures, and the underlying developmental genes differ significantly. The most appropriate option that captures the evolution of these eyes is:
(A) Convergent and analogous
(B) Divergent and homologous
(C) Convergent and orthologous

Solutions - Mock Test 12 (NEST PYQ 2025)

Biology

1. **(C) decrease in enthalpy (H) of the protein**
Formation of a salt bridge introduces a favorable electrostatic interaction, stabilizing the protein. This lowers the enthalpy (ΔH becomes more negative), while stability and T_m increase and ΔG decreases.

2. **(D) (II) and (III)**
(I) is incorrect as protons are released into the lumen, not stroma. (II) is correct since $NADP^+$ is reduced to NADPH in the stroma by PSI. (III) is correct as cytochrome b_6f pumps protons into the lumen. (IV) is incorrect since ATP synthase transports protons from lumen to stroma.

3. **(A) sporozoite and haemozoin**
The infective stage transmitted by the mosquito is the sporozoite, which is stored in the salivary glands. Recurring fever is due to haemozoin released when infected RBCs rupture.

4. **(B) veins (post-exercise); veins (at rest); arteries**
From the curve, P ($\sim$ 20 mm Hg) corresponds to veins post-exercise, Q ($\sim$ 40 mm Hg) to veins at rest, and R ($\sim$ 100 mm Hg) to arteries.

5. **(C) 2n and 2n**
During metaphase, chromosomes are duplicated but ploidy remains $2n$. At telophase, daughter nuclei are formed, each maintaining the diploid ($2n$) state.

6. **(B)** 4.5×10^{-3}
Using Michaelis–Menten,

$$v = \frac{V_{\max}[S]}{K_m + [S]} = \frac{V_{\max} \cdot 0.03}{0.06 + 0.03} = \frac{V_{\max}}{3}$$

Given $v = 1.5 \times 10^{-3}$, hence

$$V_{\max} = 3v = 4.5 \times 10^{-3}$$

.

7. **(A) 15 minutes**
Dilution:

$$0.01 \text{ mL} \to 10 \text{ mL} \Rightarrow 10^{-3}$$

Plated 0.1 mL gives 102 colonies, so cells/mL $= \frac{102}{0.1} \times 10^3 = 1.02 \times 10^6$
Using $N = N_0 \cdot 2^n$:

$$1.02 \times 10^6 = 250 \cdot 2^n \Rightarrow 2^n \approx 4080 \approx 2^{12}$$

so

$$n \approx 12$$

in 180 min.
Doubling time

$$t_d = \frac{180}{12} = 15$$

min.

8. **(D) growth factors; DNA replication; chromosome attachment to spindles**
Checkpoint 1 is the G_1 restriction point controlled by growth factors. Checkpoint 2 (G_2) ensures completion of DNA replication. Checkpoint 3 (M phase) verifies proper chromosome attachment to the spindle.

9. **(A) I-IV-II-III-V**
Overlap analysis: (I) ends with GGAGAGGG overlapping with (IV); (IV) ends with CCGT matching start of (II); (II) ends with CCCTT matching (III); (III) overlaps with (V). Hence the correct order is I $\to$ IV $\to$ II $\to$ III $\to$ V.

10. **(C) In the presence of both X-gal and lactose, but in the absence of factor Y, colonies will appear blue**
Lactose removes repression, allowing T7 RNA polymerase expression, which drives β-galactosidase production from the T7 promoter, turning colonies blue