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## ಕನ್ನಡ (ಕಡ್ಡಾಯ)

ಸಮಯ : 3 ಫಾಂಟೆಗಳು

ಗರಿಷ್ಠ ಅಂತರಗಳು : 100

## ಸೂಚನೆಗಳು

- ಅ) ಅಭ್ಯರ್ಥಿಗಳು ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳಿಗೂ ಉತ್ತರಿಸಬೇಕು.
- ಆ) ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೆ ನಿಗದಿಪಡಿಸಿರುವ ಅಂತರಗಳನ್ನು ಸೂಚನೆಯ ನಂತರ ನೀಡಲಾಗಿದೆ.
- ಇ) ಸಂಕ್ಷೇಪ ಲೇಖನವನ್ನು ನಿಗದಿತ ಹಾಳೆಯಲ್ಲಿಯೇ ಬರೆಯಿರಿ.

## ಭಾಗ - 1

1. ಈ ಕೆಳಕಂಡ ವಾಕ್ಯಗಳಲ್ಲಿ ಕಾಗುಣತಾಕ್ಷರಗಳ ತಪ್ಪುಗಳನ್ನು ತಿದ್ದಿ ಬರೆಯಿರಿ: (5×2=10)

- ಅ) ದುಸ್ಯಂತ ಸಕುಂತಲೆ ಗಂಧವ ರೀತಿಯಲ್ಲಿ ವಿವಾಹವಾದರು.
- ಆ) ಬಾರತವು ಪರಿತಾಪದ ಬಾಹೀ.
- ಇ) ಕನಾಟಕ ಸರ್ವದರ್ಮಗಳ ಬಿಡು.
- ಈ) ಯಿಯೇಕಾನಂದರು ದೀರೆ ಸಂನಾಸಿಗಳು.
- ಉ) ಬಾವನೆ ಅಂತೆ ಬಗೆವಡ.

2. ಈ ಕೆಳಕಂಡ ಗಾದೆಗಳಲ್ಲಿ ಎರಡರ ಅರ್ಥ ಸ್ವಾರ್ಪಣೆಯನ್ನು ವಿವರಿಸಿ: (2×5=10)

- ಅ) ನಗುವವರ ಮುಂದೆ ಜಾರಿ ಬಿದ್ದರು.
- ಆ) ದೋಷ ಇರುವವನಿಗೆ ರೋಷ ಹೆಚ್ಚು
- ಇ) ಉರೆಲ್ಲ ನೆಂಟರು ಉಣಿಲಿಕ್ಕುವರಿಲ್ಲ.
- ಈ) ಕಳ್ಳನಿಗೆ ಸುಳ್ಳಿಬಲ.

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3. ಈ ಕೆಳಕಂಡ ಯಾವುದಾದರೂ ಒಂದು ಪದಗಳಿಗೆ ವಿರುದ್ಧಾರ್ಥಕ ಪದಗಳನ್ನು ಬರೆಯಿರಿ: (5x1=5)

ಅ) ದಢ್ಡ	ಉ) ಶ್ರೀಮಂತ
ಆ) ವೀರ	ಇ) ನಿಶ್ಚಲ
ಇ) ಮಿತ್ರ	ಈ) ಶಾಂತಿ
ಈ) ಸಂಸಾರಿ	ಎ) ಉದ್ಯೋಗ
ಉ) ದೇವರು	ಏ) ಆರೋಗ್ಯ

4. ಈ ಕೆಳಕಂಡ ಗದ್ಯಭಾಗವನ್ನು ಒಂದಿ ಹೊನೆಯಲ್ಲಿರುವ ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ. (5x1=5)

ನಮ್ಮ ನಟರನ್ನು ಸಾಮಾನ್ಯವಾಗಿ ವಿಲಾಯಿತಿಯ ನಟರಿಗೆ ಹೋಲಿಸುವದುಂಟು. ವೀರಣ್ಣನವರನ್ನು 'ಕನಾರ್ಟಕದ ಚಾರ್ಲ್ ಚಾಪ್ಲಿನ್' ಎಂದು ಕೆಲವರು ಕರೆದಿದ್ದಾರೆ. ಚಾರ್ಲ್ ಶ್ರೇಷ್ಠ ದರ್ಜೆಯ ಹಾಸ್ಯಗಾರ. ಕರುಣಾಮಯ ಹಾಸ್ಯಾತ್ಮಾದನಯಲ್ಲಿ ಅವನು ಪರಮಸಿದ್ಧ ಆದರೆ ವೀರಣ್ಣನವರ ವಿವಿಧತೆ ಅವನಲ್ಲಿಲ್ಲ. ಮಾಣವಕ, ಕಳ್ಳ, ಬ್ರಾಹ್ಮಣ, ಮುಸಲ್ಮಾನ, ವೈಶ್ಯ, ವಿರೋಧಕ ಪಾತ್ರಗಳು ಒಂದೊಂದೂ ಒಂದೊಂದು ಬಗೆ, ಸಂಪ್ರದಾಯಕ್ಕೆ ಸೇರಿದವು. ಚಾರ್ಲ್ ಒಬ್ಬ ಹಾದಿಹೋಕನ ಪಾತ್ರದಲ್ಲಿ ತನ್ನಲ್ಲಿ ಸಿದ್ಧಾರ್ಥ, ಅನುಭವಗಳನ್ನು ಆಡಗಿಸಿಬಿಡುತ್ತಾನೆ. ಸಮಾಜದ ವಿವಿಧ ವರ್ಗದ ವ್ಯಕ್ತಿಗಳನ್ನು ಅವನು ಚಿತ್ರಿಸಲಾರೆ. ಅವನಲ್ಲಿ ವಿಷ್ಣುರವಿಲ್ಲ ಆಳವಿದೆ. ವೀರಣ್ಣನವರಲ್ಲಿ ಆಳ, ವಿಷ್ಣುರಗಳಿರದರ ಸಂಗಮವಿದೆ.

- ಅ) ವೀರಣ್ಣನವರನ್ನು ಏನೆಂದು ಕರೆದಿದ್ದಾರೆ?
- ಆ) ಚಾರ್ಲ್ ಯಾವುದರಲ್ಲಿ ಪರಮಸಿದ್ಧ?
- ಇ) ಚಾರ್ಲ್ ಹಾದಿಹೋಕನ ಪಾತ್ರದಲ್ಲಿ ಏನನ್ನು ಆಡಗಿಸಿರುತ್ತಾನೆ?
- ಈ) ಯಾರಲ್ಲಿ ವಿಷ್ಣುರವಿಲ್ಲ ಆಳವಿದೆ?
- ಉ) ವೀರಣ್ಣನವರಲ್ಲಿ ಯಾವುದರ ಸಂಗಮವಿದೆ?

## ಭಾಗ - 2

5. ಈ ಕೆಳಕಂಡ ಯಾವುದಾದರೂ ಒಂದನ್ನು ಕುರಿತು **250-300** ಪದಗಳಲ್ಲಿ ಒಂದು ಪ್ರಬಂಧವನ್ನು ರಚಿ: (1x15=15)

- ಅ) ಸಂಸ್ಕೃತ ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಸಾಹಿನೆ
- ಆ) ಸರ್ವಜ್ಞ ತಿರುವಳ್ಳುವುರ್ಬಾ ಪ್ರತಿಮೆಗಳ ಅನಾವರಣ
- ಇ) ಆಂಧ್ರ ಮುಖ್ಯಮಂತ್ರಿ ವೈ.ಎಸ್.ಆರ್. ವಿಮಾನ ದುರಂತ

6. ಈ ಕೆಳಕಂಡ ಯಾವುದಾದರೂ ಒಂದು ಪದಗಳನ್ನು ಬಿಡಿಸಿಬರೆಯಿರಿ: (5x2=10)

ಉದಾ: ಒಕ್ಕೂಡಿಸು = ಒರ್+ಕೂಡಿಸು

ಅ) ಜಗದ್ವಿಖ್ಯಾತ	ಉ) ತೊಟ್ಟಿಲೊಳಗಿನ
ಆ) ಒತ್ತೊತ್ತು	ಇ) ಬೆಳ್ಳಕ್ಕಿ
ಇ) ನಾಲ್ಕಾರು	ಈ) ಉರಾಚೆ



7. ಈ ಗದ್ದಭಾಗದ ಮೂಲ ಅರ್ಥ ಕೆಡದಂತೆ ಮೂರನೆಯ ಒಂದರಷ್ಟು ಭಾಗಕ್ಕೆ ಸಂಕ್ಷೇಪಿಸಿ ಬರೆಯಿರಿ: (1×15=15)

ಹಕ್ಕಿಗಳ ಪ್ರೋಟೋಗಳನ್ನು ನಾನು ಮೊದಲು ಪ್ರಸ್ತುತಿಗಳಲ್ಲಿ ನಿಯತ್ಕಾಲಿಕೆಗಳಲ್ಲಿ ನೋಡಿದಾಗ ಅವುಗಳ ಅಂದಚಂದಗಳನ್ನು ಎಲ್ಲರಿಂದೆಯೇ ಪ್ರಶಂಸಿಸುತ್ತಿದ್ದೆ. ಆದರೂ ಆ ಚಿತ್ರಗ್ರಾಹಕ ಪ್ರೋಟೋ ತೆಗೆಯಲು ಪಟ್ಟಿರಬಹುದಾದ ಕಷ್ಟ ತೊಂದರೆಗಳ ಅಂದಾಜು ಇರಲಿಲ್ಲ. ನೀವೂ ಸಹ ಚಿತ್ರಗ್ರಾಹಕರಾಗದ ಹೊರತು ಚಿತ್ರಗಳನ್ನು ನೋಡಿ ಮೆಚ್ಚಬಹುದೇ ವಿನಾ ಅವುಗಳನ್ನು ತೆಗೆಯುವ ಕಷ್ಟ ಏನೆಂಬುದು ನಿಮಗೆ ಗೊತ್ತಾಗುವುದೇ ಇಲ್ಲ. ನಾನು ಈವರೆಗೆ ಬದಾರು ಸಾವಿರ ಹಕ್ಕಿಗಳ ಪ್ರೋಟೋ ತೆಗೆದರಿಬಹುದು. ಅವುಗಳಲ್ಲಿ ಅರ್ಥದಷ್ಟು ನೆಗಟಿವ್ ಗಳಲ್ಲಾದರೂ ನಾನು ತೆಗೆಯಬಯಸಿದ ಹಕ್ಕಿಗಳೇ ಇಲ್ಲ. ಎಂದು ಮೇಲೆ ಎಷ್ಟೂದು ಕಾಲ, ಥಿಲ್ಲು ಹಣ ವ್ಯಾಧವಾಗಿರಬಹುದು ನೀವೇ ಉಹಿಸಿ. ಇದಕ್ಕೆ ಮುಖ್ಯ ಕಾರಣ ಹಕ್ಕಿಗಳ ಪ್ರೋಟೋ ತೆಗೆಯಲು ಹೊದ ಭಾಯಾಗ್ರಾಹಕನಿಗೆ ತನ್ನ ಕ್ಷಾಮರ ಒಂದನ್ನಾಗಿ ಇನ್ನು ಯಾವುದೂ ಅವನ ಹತೋಟಿಯಲ್ಲಿ ಇಲ್ಲದ ಪ್ರತಿಕೂಲ ಸನ್ನೌತದಲ್ಲಿ ಅವನು ಕೆಲಸ ಮಾಡಬೇಕಾಗುತ್ತದೆ. ಬೆಳಕು, ಹಕ್ಕಿಗಳು ಅವುಗಳ ಭಂಗಿ, ಹಿನ್ನಲೆ ಇವು ಯಾವುವೂ ನಿಮ್ಮ ಇಷ್ಟಕ್ಕೆ ತಕ್ಷಂತ ಇರುವುದೇ ಇಲ್ಲ. ಬೆಳಗಿನಿಂದ ಸಂಜೆಯವರೆಗೆ ಹತಯೋಗದ ಭಂಗಿಯಲ್ಲಿ ಮರೆಯೋಳಗೆ ಕುಳಿತ ಭಾಯಾಗ್ರಾಹಕ ಸಹನೆಯಿಂದ ಕಾದು ಇರುವ ಸನ್ನೌತವನ್ನೇ ಅಶ್ವತ್ತಮವಾಗಿ ಬಳಸಿಕೊಳ್ಳಲು ಹೆಣಗಬೇಕು. ಜೊತೆಗೆ ಹಕ್ಕಿಗಳು ಆಕ್ಯಾಟ ಚಿಕ್ಕಪೂ, ತುಂಬ ಚಪೆಲಚಿತ್ತದ ಪ್ರಾಣಿಗಳೂ ಆಗಿರುವುದರಿಂದ ಅಕ್ಷಸ್ಯಾತ್ ಅವುಗಳ ಪ್ರೋಟೋ ಹಿಡಿಯುವುದರಲ್ಲಿ ಭಾಯಾಗ್ರಾಹಕ ಯಶಸ್ವಿಯಾದರೂ ಹಕ್ಕಿ ರೆಕ್ಕೆ ಬಡಿದೋ, ಕುತ್ತಿಗೆ ಅಲಾಳಿಸಿಯೋ ಪ್ರೋಟೋ ಹಾಳಾಗಿರುತ್ತೆ. ಇವೆಲ್ಲಕ್ಕಂತ ಮಿಗಿಲಾಗಿ ಮನುಷ್ಯರ ಬಗ್ಗೆ ಅವಕ್ಕೆ ಇರುವ ಭಯವೇ ಚಿತ್ರಗ್ರಾಹಕರಿಗೆ ಇರುವ ಅತಿ ಮುಖ್ಯ ತೊಂದರೆ. ಅದರೆಡೆಗೆ ಗುರಿ ಹಿಡಿದಿದ್ದ ಕ್ಷಾಮರಾ ಆದರೂ ಅವು ಅದನ್ನು ಬಂದೂಕೆಂದೇ ತಿಳಿದು ಅಲ್ಲಿಂದ ಪಲಾಯನ ಮಾಡುತ್ತವೆ.

8. ಈ ಕೆಳಕಂಡ ನುಡಿಗಳನ್ನಾಗಿ ಒಂದರ ಅರ್ಥ ತಿಳಿಸಿ ಅವುಗಳನ್ನು ನಿಮ್ಮ ಸ್ವಂತ ವಾಕ್ಯಗಳಲ್ಲಿ ಪ್ರಯೋಗಿಸಿ. (5×3=15)

- ಅ) ಒಲುಮೆಗಳು
- ಆ) ದಾಡಿಡು
- ಇ) ಹಕ್ಕಿಯಂತೆ ಹಾರು
- ಈ) ಉಜ್ಜಿತಗೊಳಿಸು
- ಉ) ಕಿಚ್ಚು ಹತ್ತಿಕೊಳ್ಳು
- ಎ) ಒಗ್ಗೂಡಿಸು

9. ಈ ಕೆಳಕಂಡವುಗಳಲ್ಲಿ ಒಂದನ್ನು ಕುರಿತು ಪತ್ತ ಬರೆಯಿರಿ: (1×15=15)

- ಅ) ನಿಮ್ಮ ಬಡಾವಣೆಯಲ್ಲಿರುವ ಮದ್ದದಂಗಡಿಯನ್ನು ತರವು ಮಾಡಿಸುವಂತೆ ಸಂಬಂಧಿಸಿದ ಅಧಿಕಾರಿಗಳಿಗೆ ಒಂದು ಪತ್ತವನ್ನು ಬರೆಯಿರಿ.
- ಆ) ನೀವು ಇತ್ತೀಚಿಗೆ ಕ್ರೇಗೋಡ ಪ್ರವಾಸವನ್ನು ಕುರಿತು ನಿಮ್ಮ ಮತ್ತರಿಗೆ ಪತ್ತಪೊಂದನ್ನು ಬರೆಯಿರಿ.

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**ENGLISH**  
**(Compulsory)**

Duration : 3 Hours

Max. Marks : 100

**Instructions :**

- 1) Answers should be written in **English only**.
- 2) Answer **all** the questions.
- 3) Marks are indicated against **each** question.
- 4) Write the **PRÉCIS** on the sheet provided.
- 5) Write the question number and sub-question number **correctly**.

**PART – A**

1. Fill in the blanks with appropriate forms of the verbs given below : **(7×1=7)**  
 (begin, know, beat, lose, build, cost, leave)  
 A) The train \_\_\_\_\_ an hour ago.  
 B) England \_\_\_\_\_ by India in the Mumbai cricket in 2006.  
 C) We have \_\_\_\_\_ to suffer from malnutrition.  
 D) Had I \_\_\_\_\_ that you would be late, I'd have finished my lunch.  
 E) My new watch has \_\_\_\_\_ me Rs. 900.  
 F) Our company \_\_\_\_\_ an opportunity to win a tender last week.  
 G) Have you \_\_\_\_\_ the house on a disputed land ?
2. Each of the following sentences requires an article (A/AN/THE) at the appropriate place. Rewrite the sentences using the required article in the right position : **(3×1=3)**  
 A) Each of us has role to play.  
 B) Are you best singer of the year ?  
 C) Inspiring leader will always be remembered.
3. In the following sentences, key words have been omitted from the idiomatic expressions. Fill in the blanks to complete the idioms : **(3×1=3)**  
 A) The disobedient son turned a \_\_\_\_\_ ear to his father's advice.  
 B) The newly-wed couple left for their honeymoon with a \_\_\_\_\_ in their heart.  
 C) The unemployed youth could not make both \_\_\_\_\_ meet.

P.T.O.

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4. Complete the following sentences with appropriate prepositions chosen from the list in brackets. (5×1=5)

A) Hundreds of visitors pour \_\_\_\_\_ the city.  
(by, into, against, for)

B) She had been treasurer \_\_\_\_\_. three terms.  
(with, to, for, of)

C) It's a long journey \_\_\_\_\_ the hills to the plains.  
(from, since, between, at)

D) An extra pair of eyes can be a boon \_\_\_\_\_ insects.  
(under, on, through, to)

E) Was there any interaction \_\_\_\_\_ the speaker and the audience ?  
(between, in, across, above)

5. Correct the following sentences and rewrite the corrected versions : (7×1=7)

A) The surface of these products are smooth.

B) Let us discuss about your plans.

C) Gopi and myself will handle the job.

D) Did you buy new equipments for your factory ?

E) The cashier dispersed salary to the workers.

F) Of the six possible locations, Karwar is the better one.

G) The two company's were in competition.

### PART – B

6. Rewrite as directed : (5×1=5)

A) A \_\_\_\_\_ (perquisite/prerequisite) enjoyed by MPs is free accommodation.  
(choose the correct word)

B) The once a year elections are to be held tomorrow.  
(Replace the underlined words by a single word)

C) We were \_\_\_\_\_ (abroad/aboard) the plane 20 minutes before the departure.  
(Choose the correct word)



D) From the following list of word, choose the word opposite in meaning to the remaining words :

(careless, negligent, observant, inattentive)

E) We should be indebted to the school where we studied.

[The underlined words can be substituted by

(a) bonafide (b) alumni (c) almamater (d) magnum opus]

7. Read the following passage and answer the questions given below as directed : (5×1=5)

We may have been taught that butterflies are lovely and toads are ugly; so, we admire the butterfly and shrink away from the toad without really examining it to find out if what we had been taught is true. Or, we are taught that flowers are good and weeds are bad; so, we pull up the latter without a glance. To the artist's eye there is no good or bad. There is just the inappropriate. In the garden, weeds are not appropriate, but in the vacant lot they offer a world of enchantment. And after we have learned to see the beauty in weeds, even though we have to pull them out of the garden, we can first admire their design.

A) What have we been taught about butterflies and flowers ?

B) In the garden, weeds offer a world of enchantment. (True/False)

C) To the artist, there is only the \_\_\_\_\_ or the \_\_\_\_\_

- a) good; bad
- b) lovely; ugly
- c) appropriate; inappropriate
- d) fear; admiration.

D) In the sentence "... so, we pull up the latter without a glance", what does "latter" stand for ?

E) The message conveyed by the above passage is that we should

- a) avoid preconceived ideas.
- b) disregard what is lovely and beautiful.
- c) not admire toads and weeds.
- d) not trust our teachers.



8. A) Write a PRÉCIS of the following passage in about **90** words. State the number of words in your précis. Use the sheets provided and secure them to the answer book. Suggest a suitable title. 25

Business communication is about getting your message across clearly and in a professional manner. Writing letters and sending them by e-mail is no different. But people, who are normally competent and confident letter writers somehow find themselves hesitant when it comes to business e-mail. This is probably because it is very hard to find the right tone – it is too easy to drop into the casual conversational mode. Write e-mail letters as you would write a normal business letter. E-mail may be global but it has not yet broken down international business etiquette barriers, so start formally with ‘Dear Mr. X’ which is much better than ‘Hi there!’. Correct spelling and good grammar are essential – jokes and chatroom shorthand are out.

Doing business by e-mail can be a bit impersonal – you need to know your reader exists in the real world ! Making contact by phone as well is a good way to build your relationship. Reply to e-mails promptly. A swift ‘I’ll get back to you’ is better than silence.

Add confidentiality or security notices to your e-mails; if you are not sure who may read them – be safe rather than sorry. Do not send large attachment ; ‘snail mail’ may be better if there is time.

You can place orders, present proposals and finalise contracts via e-mail, but anything requiring a signature will still need a letter, fax or face-to-face meeting.

E-mail is instantaneous; it is intensive. Nevertheless, it is not necessary to abandon the letter writing rules that we follow in business communication.

(271 Words)

B) Answer **any one** of the following :

**15**

Write a letter to your friend about your recent trip to a historic place in Karnataka.

OR

Write a letter of complaint to the authorities concerned regarding the opening of a bar-cum-restaurant in your locality.

C) Write an essay on **any one** of the following topics in about **300** words :

**25**

- a) Global warming : causes and remedies.
- b) Imaginary meeting with an icon (dead or living) – scientists/actors/politicians may be considered.
- c) “Reading is to the mind what exercise is to the body” – Comment.



**CIVIL ENGINEERING**

Duration : 3 Hours

Max. Marks : 100

**INSTRUCTIONS**

- 1) Answer **all** questions.
- 2) Answers to be written in **English** only
- 3) Additional data required may be **assumed** suitably and mentioned clearly.
- 4) IS Codes, Handbooks and Charts are **Not Allowed**.
- 5) Part **A** contains **Three** questions and Part **B** contains **Four** questions.
- 6) Candidates are permitted to use their own simple scientific non-programmable type calculator.

**PART – A****(Each Sub-question carries one mark)**Question No : 1 Marks :  $7 \times 1 = 7$ **1. Fill in the blanks :**

- A) If two equal and opposite forces are keeping a rigid body under equilibrium they must be \_\_\_\_\_
- B) Gypsum is added to ordinary Portland cement at the time of its manufacture for the purpose of \_\_\_\_\_
- C) Presence of organic material in water is indicated by \_\_\_\_\_
- D) In a beam subjected to transverse loads only, “pure bending condition” exists in the region where shear force is \_\_\_\_\_
- E) An instrument used to measure the area of a drawing of a plot prepared after surveying the plot is \_\_\_\_\_
- F) A soil consisting of particles of all possible sizes is known as \_\_\_\_\_
- G) An instrument used to measure the difference in fluid pressure between two points in a pipe line is \_\_\_\_\_

**SEAL**

**2. Choose the correct answer :**

A) A transversal force acting away from the axis of a beam produces :

- i) Impact
- ii) Bending moment
- iii) Twisting moment
- iv) Fatigue

B) System of supplying irrigation water directly to the root zone of a plant is known as :

- i) Furrow irrigation
- ii) Sprinkler irrigation
- iii) Drip irrigation
- iv) Canal Irrigation

C) Instrument used to set out a simple curve on the ground using the method of deflection angles is :

- i) Tilting Level
- ii) Tachimometer
- iii) Theodolite
- iv) Dumpy Level

D) To measure the quantity of flow of water in a pipe line a venturimeter is preferred to orifice meter because :

- i) It is giving better reading
- ii) It is cheaper than orifice meter
- iii) It has lower head loss than in orifice meter
- iv) It is easy to measure the flow

E) If any three co-planar non parallel forces acting on a rigid body are keeping it under equilibrium then they are :

- i) Non concurrent
- ii) Producing a moment
- iii) Concurrent
- iv) Forming a couple

F) Without adding extra water, the workability of a fresh concrete can be increased by adding :

- i) Puzzolanic material
- ii) Plasticisers
- iii) Additional quantity of cement
- iv) Gypsum powder

G) In planning of a construction project "Mass diagram" is useful which provides information about :

- i) Total cost of the project
- ii) Quality of construction
- iii) Quantity of materials to be moved
- iv) Total time of construction

Question No : 3 Marks :  $6 \times 1 = 6$ 

## 3. Answer in one sentence :

- A) Why expansion joints are provided in concrete pavements ?
- B) What is the use of prismatic compass ?
- C) What is the difference between absolute pressure and gauge pressure ?
- D) What is Chejja ?
- E) Define "Bar chart" used in construction management.
- F) Effect of pore water pressure on shear strength of soil.

## PART - B

 $(4 \times 20 = 80)$ 

4. A) A block weighing 1000 N is placed on an inclined plane surface as shown in Fig. 1. Determine the magnitude of the horizontal force 'F' required to cause impending motion up the plane.

10

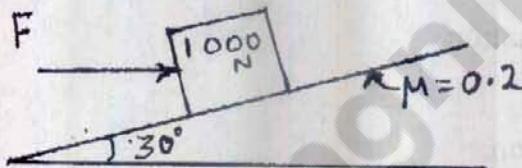


Fig. 1

B) Determine the stresses in different segments of a circular bar as shown in Fig. 2. Compute the total elongation of the bar if modulus of elasticity 'E' is 200GPA for the material.

10

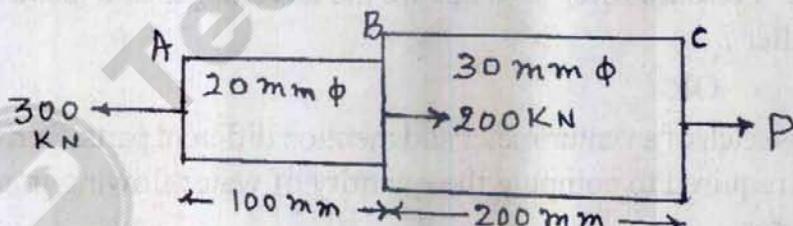


Fig. 2

OR

Explain the method of computing deflection at the centre of the beam shown in Fig. 3. using moment area method. Modulus of elasticity of the beam material is 'E' and moment of inertia of the section of the beam is 'I'.

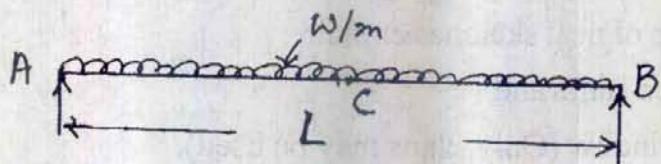


Fig. 3





5. A) Find the R.L of the top of a chimney using the following data :

Instrument station point	Reading on Bench mark in m	Angle of elevation
A	0.862	18° 36'
B	1.222	10° 12'

Stations A, B and the chimney are in the same vertical plane. Distance between A and B is 50 m. RL of Bench mark is + 100.00 m.

10

OR

Write **two** or **three** sentences about the following :

- i) Definition of "Levelling"
- ii) Box sextant
- iii) Line of collimation
- iv) Contour and
- v) Local attraction.

B) Briefly explain the classification of roads of our country on the basis of location and function (As per Nagpur road plan).

10

6. A) Explain different modes of failure of an earthen dam.

10

B) What is a "Pressure filter" ? What are the advantages and disadvantages of this type of filter ?

10

OR

Write the sketch of a venturimeter and mention different parts. Derive the discharge equation required to compute the quantity of water flowing in a pipe using the venturimeter.

7. A) Define "Workability" of a fresh cement concrete. Describe "Slump test" used to asses the workability.

10

OR

Explain the method of determining "Shear strength parameters" of clayey silt by conducting "Unconfined compression test".

B) With the help of neat sketches explain :

- i) Doglegged stairs and
- ii) Corner window (Only Plans may be used).

10





## MATHEMATICS

Duration : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

1. Answers should be written only in English.
2. Answer **all** questions.
3. Write answers for objective and descriptive type of questions in the **Answer book** itself.

## PART – A

(Each sub-question carries **one** mark)1. **Fill in the blanks.**Question No. 1 Marks :  $7 \times 1 = 7$ 

A) The number of all positive divisors of 960 is \_\_\_\_\_

B) The limit of the sequence  $\left\{ \frac{1+2+3+\dots+n}{2n^2+3n} \right\}$  is \_\_\_\_\_C) The  $n^{\text{th}}$  derivative of  $\log(1-2x)$  is \_\_\_\_\_.D) The Integrating factor of the differential equation  $\frac{dy}{dx} + \frac{2}{x}y = x^3$  is \_\_\_\_\_E)  $L^{-1} \left[ \frac{1}{3s^2 + 16} \right] =$  \_\_\_\_\_F) If  $\vec{a} = (1, 1, 1)$ ,  $\vec{b} = (1, 2, 3)$ ,  $\vec{c} = (2, 1, 4)$  then  $\vec{a} \times (\vec{b} \times \vec{c})$  is \_\_\_\_\_G) The rank of the matrix  $A = \begin{bmatrix} 1 & 3 & -2 \\ 2 & -1 & 4 \\ 1 & -11 & 14 \end{bmatrix}$  is \_\_\_\_\_

SEAL





**2. Choose the correct answer.**

(Correct answer should be chosen from among the 4 choices given)

Question No. 2 Marks :  $7 \times 1 = 7$

A) The least non-negative remainder obtained when  $64 \times 65 \times 66$  is divided by 67 is

a) 60	b) 61
c) 62	d) 63

B) If  $z = \frac{x}{y} + \frac{y}{x}$  then  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} =$

a) 0	b) 1
c) -1	d) 2

C) The area bounded by the straight lines  $x = 0$ ,  $x = 2$  and the curves  $y = 2^x$ ,  $y = 2x - x^2$  is

a) $\frac{3}{\log_2} + 4$	b) $\frac{3}{\log_2} - \frac{4}{7}$
c) $\frac{3}{\log_2} - \frac{4}{3}$	d) $\frac{4}{7} - \frac{\log_2}{3}$

D) If the function  $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$  where  $a > 0$  attains its maximum and minimum at  $p$  and  $q$  respectively such that  $p^2 = q$  then  $a$  is equal to

a) 1	b) 3
c) -1	d) 2

E)  $\int_0^2 \int_1^2 (x^2 + y^2) dx dy =$

a) $\frac{22}{3}$	b) $\frac{20}{3}$
c) $\frac{21}{4}$	d) $\frac{-22}{3}$

F) The acute angle between the planes  $2x + 2y - 3z - 5 = 0$  and  $3x - 3y + 5z - 6 = 0$  is

a)  $\cos^{-1}\left(\frac{15}{\sqrt{721}}\right)$

b)  $\cos^{-1}\left(\frac{15}{\sqrt{731}}\right)$

c)  $\cos^{-1}\left(\frac{15}{\sqrt{713}}\right)$

d)  $\cos^{-1}\left(\frac{15}{731}\right)$

G) Which of the following statement is false

a) Every cyclic group is abelian.

b) If  $f: R \rightarrow R'$  be a homomorphism of ring  $R$  in to ring  $R'$  then  $\text{Ker } f$  is a subring of  $R$ .

c) A homomorphism  $f: G \rightarrow G'$  is said to be an Isomorphism if  $f$  is one-one.

d) Every finite group is isomorphic to a permutation group.

### 3. Answer briefly.

Question No. 3 Marks : **6x1=6**

A) Show that  $\vec{F} = (6xy + z^3)\hat{i} + (3x^2 - z)\hat{j} + (3xz^2 - y)\hat{k}$  is irrotational.

B) Show that the set  $S = \{(1, 0, 0), (0, 1, 0), (0, 0, 1)\}$  is linearly independent in  $V_3(\mathbb{R})$ .

C)  $f(x, y) = x^2 - y^2$  is a harmonic function. State true or false.

D) Find  $A^{-1}$  if  $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

E) Write Lagrange's interpolation formula for unequal intervals.

F) Evaluate  $\Delta^{10} \left[ (1 - ax) (1 - bx^2) (1 - cx^3) (1 - dx^4) \right]$



## PART – B

## SECTION – 1

Answer the following questions.

(5×4=20)

4. a) Define the congruence relation on  $\mathbb{Z}$  and show that the relation 'congruence modulo  $m$ ' is an equivalence relation on  $\mathbb{Z}$ . ( $\mathbb{Z}$  is the set of integers).

OR

b) Discuss the convergence of the series  $\frac{x^2}{2\sqrt{1}} + \frac{x^3}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \dots$

5. a) State and prove Cauchy Mean Value Theorem of real analysis.

OR

b) Find the volume of the solid generated by revolving the cardioid  $r = a(1 + \cos \theta)$  about the initial line.

6. a) Show that the family of ellipses  $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$  is self orthogonal. ( $a$  and  $b$  are constants,  $\lambda$  is a parameter)

OR

b) Find an expression for the shortest distance between two skewlines whose vector equations are given by  $\vec{r} = \vec{a} + \lambda \vec{\alpha}$  and  $\vec{r} = \vec{b} + \mu \vec{\beta}$ .

7. a) Prove that every homomorphic image  $G'$  of a group  $G$  is isomorphic to some quotient group thereof.

OR

b) Verify convolution theorem for the function  $f(t) = \sin t$ ,  $g(t) = e^{-t}$  using Laplace transform.



8. a) Solve  $(y - z)p + (z - x)q = (x - y)$ .

OR

b) Find the bilinear transformation which maps  $z = \infty, i, 0$  onto  $w = 0, i, \infty$ .

## SECTION – 2

Answer the following questions :

(5×12=60)

9. a) If  $y = a \cos \left[ n \log \left( \frac{x}{n} \right) \right]$  prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$ .

b) Obtain Maclaurin's expansion of  $\log \sec x$ .

OR

c) Show that a rectangular solid of maximum volume which can be inscribed in a sphere is a cube.

d) Evaluate  $\int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy$  by changing the order of integration.

10. a) Solve  $(D^2 - 2D + 1)y = xe^x \sin x$ .

b) Solve by the method of variation of parameters  $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$ .

OR

c) Show that the lines  $\frac{x-1}{2} = \frac{y-2}{2} = \frac{z-3}{1}$  and  $\frac{x-2}{3} = \frac{y-2}{2} = \frac{z-6}{4}$  are coplanar and find the equation of the plane containing them.

d) R be the ring of all  $2 \times 2$  matrices with their elements as integers and

$S = \left\{ \begin{pmatrix} a & 0 \\ b & 0 \end{pmatrix} : a, b \in \mathbb{Z} \right\}$ . Show that S is a left ideal in R, but not a right ideal.



11. a) Find the cube roots of  $(\sqrt{3} + i)$  and represent them on the Argand plane.

b) If  $n$  is a non-zero constant, show that  $\nabla^2 r^n = n(n+1)r^{n-2}$ . Deduce that when  $r \neq 0$ ,  $r^n$  is harmonic if and only if  $n = -1$ .

OR

c) Using Gauss divergence theorem

evaluate  $\iint_S \vec{F} \cdot \hat{n} \, ds$  where  $\vec{F} = 4x\hat{i} - 2y^2\hat{j} + z^2\hat{k}$  and  $S$  is the surface enclosing the region for which  $x^2 + y^2 \leq 4$  and  $0 \leq z \leq 3$ .

d) Solve by Charpit's method

$$pxy + pq + qy - yz = 0.$$

12. a) A particle which is performing Simple Harmonic motion of period  $T$  about a centre  $O$  passes through a point  $P$  with velocity  $V$  in the direction  $OP$ . Prove that

the time which elapses before it returns to  $P$  is  $\frac{T}{\pi} \tan^{-1} \left( \frac{VT}{2\pi OP} \right)$ .

b) A particle is thrown over a triangle from one end of a horizontal base and grazing over the vertex falls on the other end of the base. If  $A, B$  be the base angles of the triangle and  $\alpha$  the angle of projection, prove that  $\tan \alpha = \tan A + \tan B$ .

OR

c) Show that  $u = e^x \sin y + x^2 - y^2$  is harmonic and find its harmonic conjugate.

d) Evaluate  $\int_C \frac{z}{(z^2+1)(z^2-9)} \, dz$  where  $C: |z| = 2$ .





13. a) Find the minimum value of  $z = -x + 2y$  subject to the constraints  $-x + 3y \leq 10$ ,  $x + y \leq 6$ ,  $x - y \leq 2$ ,  $x, y \geq 0$  using graphical method.

b) Obtain all the basic feasible solutions of the system of linear equations

$$x_1 + 2x_2 + x_3 = 4$$

$$2x_1 + x_2 + 5x_3 = 5$$

OR

c) Find a real root of the equation  $xe^x - 2 = 0$  correct to three decimal places using Newton-Raphson method.

d) Solve  $\frac{dy}{dx} = 3x + \frac{y}{2}$  using Runge-Kutta method with  $y(0) = 1$ . Compute  $y(0.2)$  by taking  $h = 0.2$ .





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## AGRICULTURE

Duration : 3 Hours

Maximum Marks : 100

### INSTRUCTIONS

1. Answers should be written only in **English**.
2. Answer **all** questions taking note of choice questions wherever given.
3. Write answers for objective and descriptive type questions in the **Answerbook** itself.

### PART – A

(Each sub-question carries **one** mark)

**1. Fill in the blanks :** (10×1=10 Marks)

- a) \_\_\_\_\_ is the major processed product of mango prepared and exported from India.
- b) In acid soils, availability of added P is less due to its fixation in the soil as \_\_\_\_\_ and \_\_\_\_\_ phosphates.
- c) Cliestogamy refers to \_\_\_\_\_ condition of the flower.
- d) The example for reflecting type of antitranspirant is \_\_\_\_\_.
- e) The insect vector \_\_\_\_\_ transmits katte disease of cardamom and bunchy top of banana.
- f) Proportionate rate of change in output to proportionate rate of change in input is called \_\_\_\_\_.
- g) A quality seed should be \_\_\_\_\_ pure and possess high \_\_\_\_\_.
- h) Meloidogyne sp. causes \_\_\_\_\_ disease in vegetables.
- i) Plant growth hormone that helps fir chlorophyll retention in leaves is \_\_\_\_\_.
- j) Swarnajayanti Gram Swarozgar Yojana, a Self-employment Generation Programme was implemented in the country in the year \_\_\_\_\_.

SEAL





2. Choose the right answer : (10×1=10)

a) Commonly cultivated potato is a

- a) Auto tetraploid
- b) Auto hexaploid
- c) Diploid
- d) Triploid

b) The 'active soil forming factors' are

- a) Parent material & Climate
- b) Climate & Time
- c) Climate & Biota
- d) Time & Relief

c) Single Seed Descent method of selection is practised in the following generation

- a) F1
- b) F2
- c) F6
- d) None of the above

d) The herbicide Glyphosate is

- a) Non-selective contact
- b) Non-selective translocated
- c) Both of these
- d) None of these

e) A pest which is found both in field and storage on sweet potato is

- a) Phthorimaea operculella
- b) Cylas formicarius
- c) Lasioderma serricorne
- d) Trogoderma glanarium

f) In a regulated market

- a) Arrivals of agricultural produce is regulated
- b) Market practice for agricultural produce is regulated
- c) Price of the agricultural produce is regulated
- d) Demand for agricultural produce is regulated



g) \_\_\_\_\_ represents the point of attachment of seed to its stalk.

- a) Hilam
- b) Raphe
- c) Micropyle
- d) Plumule

h) Flagellation is genus *Erwinia* is

- a) Amphitrichous
- b) Lophotrichous
- c) Monotrichous
- d) Peritrichous

i) Chlorophyll molecule contains the following mineral elements

- a) Fe and Mg
- b) N and Mg
- c) 2n and Fe
- d) S and N

j) An extension method which aims at showing the value or worth of new practice is

- a) Method demonstration
- b) Result demonstration
- c) On campus training
- d) Off campus training

## PART - B

Write short notes on **any five** of the following :

(5×4=20 Marks)

3. Use of root stocks in citrus.
4. Salt affected soils and their management.
5. Mutation and the procedure of mutation breeding in crop plant improvement.
6. Water-use efficiency.
7. World Trade Organization.
8. Maintenance of Genetic purity during seed production.
9. Photorespiration.
10. Factors to be considered in selection of appropriate extension methods for effective transfer of technology.



Answer **any five** of the following :

**(5×12=60 Marks)**

11. Problems and prospects in cultivation and processing of fruit, vegetable and flower crops in India.
12. What are the salient features of 'Soil Taxonomy' and its structure ? How different 'Categories' in the system are differentiated ? List the ten common Soil Orders with their major characteristics.
13. Define heterosis and explain different types of heterosis. Explain the two theories of heterosis, their objections and clarifications. Also, explain how heterosis has been exploited in rice.
14. Define watershed and discuss the role of watershed management for sustainable agricultural production including the components, objectives, approaches and strategies for implementation of watershed development programme.
15. Mention four important pests of coconut along with nature of damage, damage symptoms and management practices.
16. Define seed deterioration and causes for the same. What are the visible and non-visible expressions of seed deterioration ? Briefly explain three important methods of measuring seed deterioration.
17. Explain in detail economic importance, symptoms, cause, epidemiology and integrated management of stem rust of wheat.
18. i) Write the diagram of 'Z' scheme of light reaction.  
ii) Mention the different phases of dark reaction (C3 pathway) and explain the reductive phase neatly.  
iii) Explain different environmental factors affecting photosynthesis and productivity.

SEAL



## FORESTRY - II

Duration : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

1. Answer should be written only in **English**.
2. Answer **all** questions taking note of choice questions wherever given.
3. Write answers for objective and descriptive type questions in the **Answer book** itself.

## PART - A

(Each Sub-question carries **one** mark)1. **Fill in the blanks :**Question No. 1 Marks :  $7 \times 1 = 7$ 

- The form factor is used for the purpose of estimation of \_\_\_\_\_ of standing trees.
- Bagasse as one of the agricultural sources is used in \_\_\_\_\_ manufacture.
- The fibre obtained from caryota urens is called as \_\_\_\_\_ fibre.
- The Biodiversity Treaty was signed by 171 countries including India at the Earth Summit in Brazil in the year \_\_\_\_\_.
- The size and distribution of several ecosystems and their interactions across a given land surface is referred to \_\_\_\_\_ diversity.
- Diversion of forest area to agricultural purpose was emphasized in that National Forest Policy enunciated during the year \_\_\_\_\_.
- Electrostatic precipitation is generally used as a method for measurement of \_\_\_\_\_ pollution.

2. **Choose the correct answer :**Question No. 2 Marks :  $7 \times 1 = 7$ 

- It is one of the bad fuel wood species.
  - i) Sissoo
  - ii) Oak
  - iii) Jamun
  - iv) Maharukh
- The biomass estimation on unit area basis is done based on categorization of diameter classes in
  - i) Stratified tree technique
  - ii) Mean tree technique
  - iii) Unit area method
  - iv) Basal area proportion method

P.T.O.





C) In unmanaged forests, rotation tends to be longer because

- The growth of individual tree is boosted
- The growth of individual tree is retarded
- There is no intense competition
- None of these

D) The voluntary organization involving women and children in Social Forestry Programme is

- Sadguru Seva Sangh
- Anand Niketan Ashram
- Society for Wasteland Development
- The Ulthan trust

E) Cineole oil which is mostly used in pharmaceutical industry is obtained from the leaves of

- Neem
- Babul
- Sal
- Eucalyptus

F) The most important factor influencing commercial farm forestry for adoption by small farmers for returns is

- Long gestation period
- Lack of suitable trees
- Bulkness of products
- Low returns

G) Because of its toughness combined with light weight and amenability to neat scooping by hand tools, willow is the ideal timber used for

- Railway coaches
- Shoelasts
- Artificial limbs
- Pitprops

3. Answer in **one** sentence :

Question No. 3 Marks : **6×1=6**

- What is stereoscopy ?
- What is Ex-situ conservation of Biodiversity ?
- What are the growth rings ?





- D) Define GAI.
- E) What is Pinknot ?
- F) What does the term 'Canes' represent ?

### **PART – B**

#### **SECTION – I**

Write short notes on **any five** of the following :

**5×4=20**

- 4. The advantages of remote sensing.
- 5. Strategy for popularising non timber forest produce.
- 6. Sub divisions of indirect values provided by biodiversity that do not involve harvesting or destroying the natural resources.
- 7. Manifold uses of essential oils from which man is benefited.
- 8. Two distinct strains of lac insects in India.
- 9. Types of forest fires classified on the basis of their intensity and place of action.
- 10. Collection and curing of Tendu leaves.
- 11. Types of forests classified by National Forest Policy of 1952.

#### **SECTION – II**

Answer **any five** of the following questions :

**5×12=60**

- 12. Discuss the process of estimation of growing stock in preparation of forest inventory. **12**
- 13. Describe the standard rules governing breast height measurement under different tree stem positions along with neat diagrams. **12**
- 14. Explain the ill effects of deforestation causing damage to the environment in various ways. **12**





15. Discuss the various issues to be considered for implementation to achieve the goals of sustainable forest management and biodiversity conservation. 12

16. a) What is seasoning ? Write the objectives of seasoning wood. 4  
b) Write the common seasoning defects and causes which bring about these defects. 8

17. Explain the important decisions to be frequently made by the foresters wherein economic analysis can be usefully employed. 12

18. a) What are the effects of grazing on forests ? 4  
b) Explain the direct control measures for regulation of grazing in Forest areas. 8

19. a) Discuss the important points in fixing the rotation, if we analyse the rotations fixed to various forest crops. 6  
b) Explain the various kinds of rotations classified based on the objects of management and also of necessity. 6





## FORESTRY - I

Duration : 3 Hours

Maximum Marks : 100

## INSTRUCTIONS

1. Answer should be written only in **English**.
2. Answer **all** questions taking note of choice questions wherever given.
3. Write answers for objective and descriptive type questions in the **Answer book** itself.

## PART - A

(Each sub-question carries **one** mark)Question No. 1 Marks :  $7 \times 1 = 7$ 1. **Fill in the blanks :**

- A. The hedge rows are cut back and kept pruned during the cropping period in \_\_\_\_\_ type of Agroforestry Practice.
- B. A practice of raising trees on canal banks, railway lines, road sides etc. is termed as \_\_\_\_\_ forestry.
- C. Plant succession that comes up in areas which have previously not borne in any form of vegetation is called \_\_\_\_\_ succession.
- D. Bamboo is multiplied naturally annually during the rains from \_\_\_\_\_.
- E. Cutting of trees at a height of 2 meters for green leaf manuring and avoiding shade effect on intercrops in an agroforestry system is known as \_\_\_\_\_.
- F. Suppressed, dominated and diseased trees are removed in \_\_\_\_\_ thinning type.
- G. The best approach of alternate land use in watershed areas is \_\_\_\_\_ system to enhance the production without disturbing the ecosystem.

P.T.O.



SEAL



Question No. 2 Marks : 7x1=7

**2. Choose the correct answer.**

A. Mimosine content in subabul leaves can be reduced to half by immersing in solution of

- i) Sodium chloride
- ii) Ferrous sulphate
- iii) Potassium chloride
- iv) Ammonium sulphate

B. The model watershed programmes are being implemented by different State Governments under technical supervision of

- i) ICRISAT
- ii) IGFRI
- iii) CIDA
- iv) CRIDA

C. Sporadic flowering occurs in this tree species.

- i) Bamboo
- ii) Teak
- iii) Casuarina
- iv) Sandal wood

D. The suitable agroforestry system for class IV and above lands is

- i) Agri horticulture
- ii) Agri silvipastoral
- iii) Agri hortipastoral
- iv) Silvipastoral

E. Forest is defined as a plant community comprising mainly of trees and associated woody vegetation usually with a close canopy according to

- i) Legal definition
- ii) General definition
- iii) Ecological definition
- iv) Dictionary

F. The wrenching operation in seed bed is done for

- i) Shoot manipulation
- ii) Population manipulation
- iii) Root manipulation
- iv) Soil manipulation

G. A tree which appears phenotypically desirable and is to be evaluated is called

- i) Candidate tree
- ii) Select tree
- iii) Plus tree
- iv) Elite tree





Question No. 3 Marks :  $6 \times 1 = 6$

3. Answer in **one** sentence :

- A. What is Form factor ?
- B. What is pricking out ?
- C. What are the characteristic features of the habitat of Mangrove vegetation ?
- D. What does Silvics deal with ?
- E. What is the mixture used for making bricks in brick planting method ?
- F. What is the purpose of D & D methodology followed in Agroforestry systems ?

**PART – B**

**SECTION – I**

Write short notes on **any five** of the following :

**(5×4=20)**

- 4. Importance of succession in Silviculture.
- 5. Operations usually prescribed in improvement felling.
- 6. Advantages with mycorrhizae fungi inoculation.
- 7. The principles and benefits of watershed management.
- 8. Precautions for establishing seed orchards.
- 9. Pre-sowing treatment methods for teak seed.
- 10. Utility of vegetative propagation in tree improvement.
- 11. Use of Bamboo for different purposes.





## SECTION – II

Answer **any five** of the following questions :

$$(5 \times 12 = 60)$$

## CHEMISTRY

Time : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

- 1) Answers should be written only in **English**.
- 2) Answer **all** questions.
- 3) Write all your answers (Objectives/Descriptives) in the **answerbook** itself.

## PART – A

(Answer **all** the questions. **Each** Sub-question carries **one** mark)

## Fill in the blanks :

Question No. 1 Marks : **5×1=5**

1. a) The electronic configuration of element copper (atomic number 29) is \_\_\_\_\_.
- b) The radius of  $\text{Na}^+$  is \_\_\_\_\_ than the radius of Na atom.
- c) The hybridised state of C in  $\text{C}_2\text{H}_6$  is \_\_\_\_\_.
- d) The abbreviation LCAO stands for \_\_\_\_\_.
- e) The metal present in haemoglobin is \_\_\_\_\_.

## Fill in the blanks :

Question No. 2 Marks : **5×1=5**

2. a) An example of a hexadentate ligand is \_\_\_\_\_.
- b) All spontaneous processes are accompanied by \_\_\_\_\_ in entropy.
- c) The catalyst used in Friedel-Craft's alkylation is \_\_\_\_\_.
- d) The number of peptide bonds present in tetrapeptides is \_\_\_\_\_.
- e) The region of electromagnetic radiation useful in the study of vibrational transitions is \_\_\_\_\_ region.

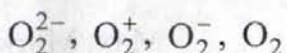
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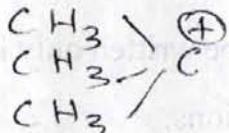
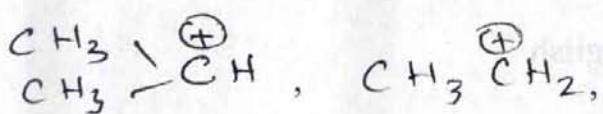
SEAL

Question No. 3 Marks :  $5 \times 1 = 5$ 

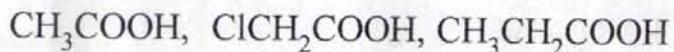
3. a) Arrange the following in the increasing order of their bond strength



b) Arrange the following in the increasing order of their stabilities



c) Which one of the following is most acidic ?



d) Write the zwitter ion structure of Alanine.

e) Write the Nernst equation for single electrode potential.

Question No. 4 Marks :  $5 \times 1 = 5$ 

4. a) How is half life related to the order of a reaction ?

b) How does molar conductance and specific conductance of a weak electrolyte vary with dilution ?

c) Identify the electrophile in an aromatic sulphonation reaction.

d) Give an example each for reducing and non reducing sugars.

e) Define the term 'enantiomers'.

### PART – B

#### SECTION – 1

Answer **all** the questions. **Each** question carries **4** marks. Some questions have **internal** choice.

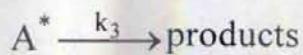
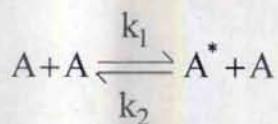
$5 \times 4 = 20$

5. a) Transition metals form coloured compounds with other elements. Give reason.

b)  $\text{K}_3[\text{Co F}_6]$  is highly paramagnetic but  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$  is diamagnetic. Give reason.



6. For the reaction sequence



assuming steady state approximation for  $A^*$ , find the order of the reaction if  $k_2 \gg k_3$ .

OR

For the cell  $\text{Zn}|\text{Zn}_{\text{aq}}^{++}(0.01\text{M})||\text{Cu}_{\text{aq}}^{++}(0.05\text{M})|\text{Cu}$  calculate the equilibrium constant for the spontaneous cell reaction at 298 K.

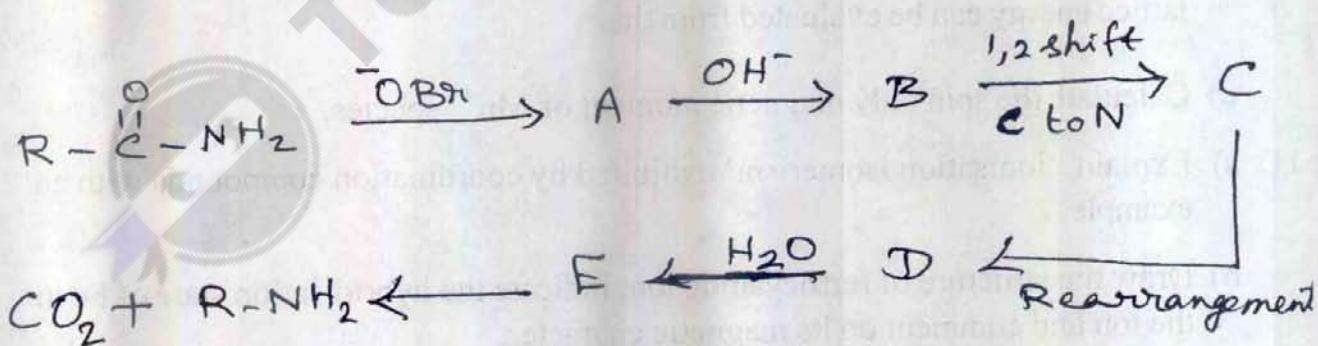
$$[E_{\text{Zn}}^{\circ} = -0.76\text{V} ; E_{\text{Cu}}^{\circ} = +0.34\text{V}]$$

7. a) Set up the M.O. diagram of  $\text{O}_2$  molecule and comment on its magnetic nature.  
 b) Explain with an example, the mechanism of a homogeneously catalysed reaction.

8. a) Describe the  $E_2$  mechanism in which the H leaves first and then the X. In what kind of reactions is this mechanism more likely to be followed ?

OR

b) Identify A, B, C, D and E and write their structures in the following reaction sequence.

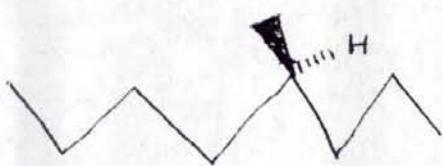


9. a) Write the structures of E and Z forms of 3-methyl-2-pentene.  
 b) Draw the structure of 3, 4-Dimethyl-1-pentene and identify the stereogenic centre.

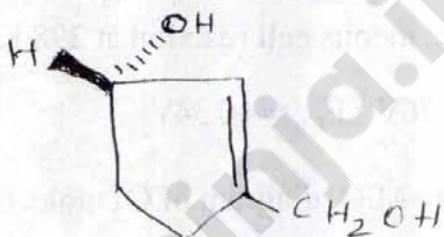
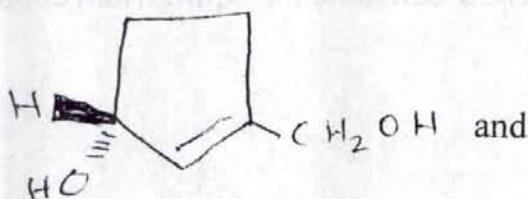
OR



c) Write the configuration and IUPAC name of the following molecule



d) How are the following molecules related?



## SECTION – 2

Answer **all** questions availing internal choice. Each question carries **twelve** marks.

**5×12=60**

10. a) Write all possible values of quantum numbers  $l$  and  $m$  for the principal quantum number  $n = 3$ .
- b) Set up the Born-Haber cycle for the formation of  $\text{NaCl}(\text{s})$  and show how its lattice energy can be evaluated from this.
- c) Calculate the spin only magnetic moment of  $\text{Mn}^{4+}$  species.

11. a) Explain ‘ionisation isomerism’ exhibited by coordination compounds with an example.
- b) Draw the structure of ferrocyanide ion, indicate the hybridisation state of Fe in the ion and comment on its magnetic character.
- c) Draw the structures of  $\text{CO}_2$  and  $\text{H}_2\text{O}$  molecules and comment on their dipole moments.
- d) Explain lanthanide contraction.





12. a) The rate constants for a reaction at 300 K and 400 K are  $4 \times 10^{-4} \text{ s}^{-1}$  and  $2 \times 10^{-2} \text{ s}^{-1}$  respectively. Find the activation energy for this reaction.

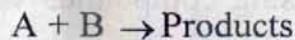
b)  $\Delta H$  and  $\Delta S$  for a reaction are  $60 \text{ kJ mol}^{-1}$  and  $40 \text{ JK}^{-1} \text{ mol}^{-1}$  respectively. At what temperatures the reaction becomes spontaneous ?

c) Write the Debye Huckel Onsager equation and explain the terms.

d) Zinc displaces copper from an aqueous solution of  $\text{CuSO}_4$ . Give reason.

OR

- e) How does the enthalpy of a reaction vary with temperature ? Derive this equation.
- f) What are 'active centres' ? How can they be increased ?
- g) Calculate the entropy change when 10 moles of an ideal gas undergoes isothermal reversible expansion from  $10 \text{ dm}^3$  to  $100 \text{ dm}^3$  at 300 K. ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ )
- h) A reaction



yielded the following experimental data. Find the order of the reaction.

Concentration of A	Concentration of B	Rate of the reaction
0.5 M	0.5 M	x
1.0 M	0.5 M	2x
0.5 M	1.0 M	4x

13. a) Give a structure consistent with each of the following sets of NMR data

i) $C_4H_9Br$	ii) $C_{10}H_{13}Cl$
doublet $\delta$ 1.04, 6 H	singlet $\delta$ 1.57, 6 H
multiplet $\delta$ 1.95, 1 H	singlet $\delta$ 3.07, 2 H
doublet $\delta$ 3.33, 2 H	singlet $\delta$ 7.27, 5 H



b) Explain how the configurations of compounds containing more than one chiral carbon be established taking 2, 3, 4- Trihydroxy butanal as an example.

OR

c) How was the open chain structure of D-fructose established ?  
d) What are the shortcomings of the open chain structure ? How were they overcome ?

14. a) Describe the mechanism of Beckmann rearrangement. Using this rearrangement, write the conversion of Cyclohexanone to caprolactam.

OR

b) As an evidence for  $SN_2$  mechanism describe the conversion of  
(+)-1-phenyl-2-propanol to  
i) (-)-ether and ii) (+)-ether and explain where exactly inversion takes place.  
c) Give another kind of evidence for  $SN_2$  mechanism using compounds with potential leaving groups at bridge head carbons.

## BOTANY

Duration : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

1. Answer should be written only in **English**.
2. Answer **all** questions.
3. Write answers for objective and descriptive type question in the **Answerbook** itself.

## PART – A

(Each sub-question carries **one** mark)Question No. 1 Marks :  $7 \times 1 = 7$ 

1. Fill in the blanks :
  - A. Loss of liquid water by guttation occurs through \_\_\_\_\_
  - B. Citrus canker is caused by \_\_\_\_\_
  - C. Special types of rejuvenating spores produced by diatoms are called \_\_\_\_\_
  - D. Structure of chromosome is clearly visible during \_\_\_\_\_
  - E. The transfer of genetic material of one bacterium to another by virus is called \_\_\_\_\_
  - F. In Angiosperms, triple fusion results in the formation of \_\_\_\_\_
  - G. Smog is a result of \_\_\_\_\_

2. Choose the correct answer :

Question No. 2 Marks :  $7 \times 1 = 7$ 

- A. In which of the following groups would you place a plant which produces spores, has vascular tissues and lacks seeds ?
  - i) Algae
  - ii) Bryophytes
  - iii) Pteridophytes
  - iv) Gymnosperms

P.T.O.



SEAL



B. Persistent calyx and oblique carpels are the salient features of the family

- i) Apocynaceae
- ii) Leguminaceae
- iii) Solanaceae
- iv) Asteraceae

C. Simple tissues are these

- i) Parenchyma, xylem and collenchyma
- ii) Parenchyma, collenchyma and sclerenchyma
- iii) Parenchyma, xylem and sclerenchyma
- iv) Parenchyma, xylem and phloem

D. Jack fruit is a

- i) Syconus
- ii) Sorosis
- iii) Berry
- iv) Pepo

E. Potometer is an instrument used for measuring the rate of

- i) Respiration
- ii) Transpiration
- iii) Growth
- iv) Translocation

F. 1:2:1 genotypic ratio in a monohybrid cross indicates

- i) Dominance
- ii) Segregation
- iii) Independent Assortment
- iv) Co-ordination

G. Acid rain is caused due to increase in the concentration of

- i) Carbon dioxide
- ii) Carbon monoxide
- iii) Nitrous oxides
- iv) Sulphur dioxide

3. Answer in **one** sentence :

Question No. 3 Marks : **1×6=6**

A. What are cristae ?

B. What is Etiology ?

C. Define cleistogamy.

D. Where do you find Casparyan thickenings ?

E. Name the fungus from which Gibberelin is extracted.

F. What are thylakoids ?



**PART – B**

**SECTION – 1**

**(5×4=20)**

4. Write notes on :

A. Salient features of Apocynaceae.

OR

B. Sporophyte of Marchantia.

5. A. Air pollution

OR

B. Types of vascular bundles.

6. A. Dwarf shoot of Pinus.

OR

B. Thallus organisation in Algae.

7. A. Economic importance of Lichens.

OR

B. Significance of Transpiration.

8. A. Koleroga

OR

B. Synangium of psilotum.

**SECTION – 2**

9. Answer the following :

**(5×12=60)**

A. Describe briefly prophase-1 of Meiosis in plant cell and add a note on the significance of Meiosis.

OR

B. Give a detailed account on vegetation of Karnataka.





10. A. Describe the structure of Double helix model of DNA and add a note on DNA replication.

OR

B. Define photo-phosphorylation. Describe cyclic and non-cyclic photo-phosphorylation.

11. A. Describe the life cycle of puccinia on wheat plant.

OR

B. What is Soil Erosion ? Explain the various types of Soil Erosion and steps involved in soil conservation.

12. A. What is plant succession ? Give a brief account on xerosere.

OR

B. Describe the process of double fertilization in angiosperms.

13. A. Mention the salient features of the following families with two examples :

- i) Musaceae
- ii) Brassicaceae
- iii) Cucurbitaceae.

OR

B. Write the Botanical name, family, part used and economic importance of the following :

i) Wheat	ii) Clove	iii) Groundnut
iv) Coffee	v) Ravoulfia	vi) Tobacco





Duration : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

- 1) Answer should be written only in **English**.
- 2) Answer **all** questions.
- 3) Write your answers (Objective/Descriptive) in the **answer book** itself.

## PART – A

(Each sub-question carries **one** mark)**Fill in the blanks :**

Question No. 1

Marks : **5×1=5**

A) The rms velocity of gas molecules on the basis of Kinetic Theory of Gases is given by \_\_\_\_\_

B) When the tension of a stretched string is increased four times and the length of the string is doubled, then the frequency of the string is \_\_\_\_\_ as compared to the original frequency.

C) When the monochromatic yellow light is replaced by blue light in the Fresnel's Biprism interference experiment, then the width of the fringes \_\_\_\_\_ and the fringes are \_\_\_\_\_ in the field of view.

D) The power factor of a series LCR circuit at resonance is \_\_\_\_\_

E) The graph of de-Broglie wavelength of an electron plotted against its linear momentum gives \_\_\_\_\_

**Choose the Correct Answer :**

Question No. 2

Marks : **5×1=5**

A) In a diffraction grating experiment, the grating has  $10^5$  rulings. Then, in the wavelength region of  $5000\text{\AA}$  of the spectrum and in the second order, the grating can resolve two lines with a wavelength difference of

a)  $25\text{\AA}$       b)  $2.5\text{\AA}$       c)  $0.25\text{\AA}$       d)  $0.025\text{\AA}$

B) The electric field components of a plane electromagnetic wave are given by  $E_x = 2E_0 \cos(\omega t - kz)$  and  $E_y = E_0 \sin(\omega t - kz)$ . The state of polarization of the wave will be

a) Circular      b) Plane      c) Elliptical      d) Unpolarised

SEAL





C) The mass of a proton is 1836 times the mass of an electron. They are projected into a uniform magnetic field with the same kinetic energy at right angles to the field direction. Then,

- The electron trajectory is less curved than the proton trajectory
- The proton trajectory is less curved than the electron trajectory
- Both the trajectories are equally curved
- Both the trajectories are straight

D) The position and momentum of 1 keV electron are simultaneously determined. If its position is determined within 0.4 nm, the percentage uncertainty in its momentum is

- 1.5%
- 2.2%
- 4.4%
- 6%

E) A Raman line at a wavelength of 462.4 nm was observed with the exciting radiation of wavelength 435.8 nm. The corresponding Anti-stokes' line is at a wavelength of

- 512.2 nm
- 412.1 nm
- 479.6 nm
- 452.3 nm

Answer in **one** sentence :

Question No. 3

Marks : **5×1=5**

- What is meant by invariance of Physical Laws ?
- What is Compton effect ?
- In a Bohr hydrogen atom, the angular momentum of electron is  $3\hbar$ . Find the energy of the electron in eV.
- Where does it take longer time to cook rice in an open vessel : Bangalore or Himalayas ? Why ?
- What is the percentage change in the optical rotation produced by a sugar solution if length is increased by 50% and concentration is decreased by 50% of its initial value ?

State **True or False** :

Question No. 4

Marks : **5×1=5**

- Efficiency of a Carnot engine can be 100%.
- Waves in a stretched string can be either longitudinal or transverse.
- The critical magnetic field is the external field applied on a superconductor to just destroy its superconductivity and convert into ordinary conductor.
- The result of Michelson-Morley interference experiment showed that there was no ether drag. Further, it established the fact that the speed of light in free space is the same everywhere, regardless of motion of source or observer.
- The molecular spectrum of a diatomic molecule lies only in the infrared region.





PART – B

SECTION – 1

(5x4=20)

(Each question carries four marks)

5. a) Mention the advantages of centre of mass frame as compared to that of a laboratory frame.

OR

b) Derive an expression for the force acting on a conductor carrying current kept in a magnetic field.

6. a) Define Mean free path of a gas molecule and obtain an expression for it.

OR

b) State and explain Pauli's Exclusion Principle. How many electrons can be accommodated in a given shell ?

7. a) Derive an expression for velocity of longitudinal waves in a rod.

OR

b) Describe the construction and working of Ruby Laser.

8. a) Mention the differences between Zone plate and convex lens.

OR

b) Distinguish between half-wave rectifier and full wave rectifier.

9. a) What is Coriolis force ? Describe the effect of Coriolis force on a freely falling particle.

OR

b) Starting from the Lorentz transformation equations, derive the velocity addition theorem under special relativity.





## SECTION – 2

(5×12=60)

(Each question carries 12 marks)

10. a) Derive Kepler's laws from Newton's law of gravitation.

OR

b) Describe the experimental set up for studying the anomalous Zeeman effect. Explain the theory of anomalous Zeeman effect.

11. a) Describe the characteristics of the energy spectrum of a black body. Derive the Planck's law of radiation.

OR

b) Give the Huygens' theory of double refraction. Explain Huygens' construction for double refraction in Uniaxial negative crystals when optic axis is in the plane of incidence and parallel to the refracting surface for i) oblique incidence and ii) normal incidence.

12. a) Derive Maxwell's equations of electromagnetism.

OR

b) Describe Millikan's oil drop experiment to determine the charge of an electron.

13. a) Describe the Davisson – Germer experiment on electron diffraction with necessary theory.

OR

b) Obtain an expression for electrical conductivity of metals on the basis of free electron theory of metals.

14. a) Derive an expression for relativistic variation of mass with velocity.

OR

b) What is Hall effect ? Derive an expression for Hall coefficient in the case of metals. Qualitatively, explain the hall effect in p-type and n-type semiconductors. What is the significance of Hall effect in semiconductors ?

## ZOOLOGY

Time : 3 Hours

Max. Marks : 100

## INSTRUCTIONS

1. Answers should be written only in English.
2. Answer **all** questions.
3. Write answers for objective and descriptive type questions in the **Answer Book** itself.

## PART – A

Question No. 1 Marks :  $7 \times 1 = 7$ 

1. **Fill in the blanks** with appropriate words :

A) \_\_\_\_\_ is the migration of fresh water fish to salt water for spawning.

B) \_\_\_\_\_ is the last stage in the prophase of first Meiotic division.

C) \_\_\_\_\_ is the principle moulting hormone of insects.

D) \_\_\_\_\_ bond binds monosaccharide to form a disaccharide and polysaccharide.

E) \_\_\_\_\_ are the internal asexual buds of sponges.

F) The sessile, bottom dwelling organisms in an aquatic ecosystem are called \_\_\_\_\_

G) \_\_\_\_\_ is the sensitive fleshy hanging process at the back of the soft palate.

2. What is pygostyle ? What is its function ? Mark : 1
3. What are Weberian ossicles ? Mark : 1
4. Give the general formula of Vital Index. Mark : 1

P.T.O





5. Define Gause's Principle. Mark : 1

6. Name the two Purine bases of RNA. Mark : 1

7. What are Leydig cells ? Mark : 1

8. Give any two examples for Concealing mimicry. Mark : 1

9. **Choose the correct choice** from the following : Question No. 9 Marks : **6×1=6**

A) Onchosphere is connected with

- a) *Ascaris lumbricoides*
- b) *Fasciola hepatica*
- c) *Taenia solium*
- d) *Plasmodium vivax*

B) The test of ascidians are made up of

- a) Mucin
- b) Tunicin
- c) Chitin
- d) Chondrin

C) Pick the reptile

- a) Surinam toad
- b) Desert toad
- c) Clawed toad
- d) Midwife toad

D) The inter cellular proteolytic enzyme, Cathepsin is synthesized by

- a) Lysosomes
- b) Ribosomes
- c) Mitochondria
- d) Golgi bodies

E) This Vitamin increases the absorption of Calcium and Phosphate in the gut.

- a) Vit-A
- b) Vit-B
- c) Vit-C
- d) Vit-D

F) Bidder's organ is found in

- a) Planaria
- b) Star fish
- c) Frog
- d) Turtle



**PART – B**

**SECTION – I**

**(5×4=20)**

10. a) Differentiate between Ecto and Endothermic animals. Give one example for each.

**OR**

b) Explain with suitable diagram the looping and somersaulting movement in Hydra.

11. a) Explain with diagrams the Pinocytosis and Phagocytosis.

**OR**

b) What is the difference between National Parks and Wild life Sanctuaries ? Give one example for each.

12. a) List out three salient features of phylum Echidermata. Classify the phylum upto classes.

**OR**

b) Find out the probable offsprings of a woman who is normal but the father being colour blind marries a man who is normal but also with a colourblind father.

13. a) Describe Chloride shift.

**OR**

b) Describe Biological Magnification.

14. a) Draw a neat labeled diagram of the ventral view of brain of frog.

**OR**

b) Describe In Vitro Fertilization (IVF).





## SECTION – II

(3×20=60)

15. a) Trace the evolution of aortic arches among vertebrates with suitable labeled diagrams.

OR

b) Describe the physiology of the transmission of nerve impulse.

16. a) Define fertilization. With the help of labeled diagrams explain the process and list out three important significances of this act.

OR

b) Describe the energy flow in a typical ecosystem.

17. a) List out the drawbacks of Darwinism and substantiate the modified Synthetic theory of evolution.

OR

b) What are proteins ? Classify with examples and list out any four important functions of it to life.

