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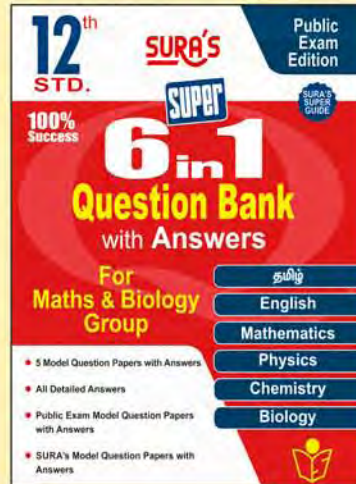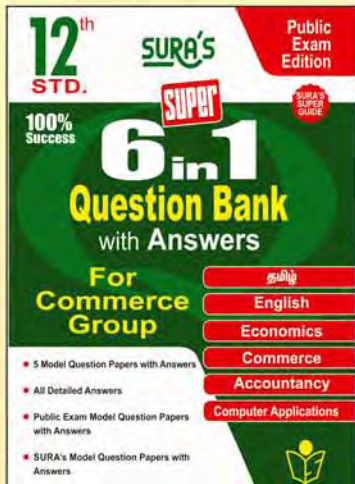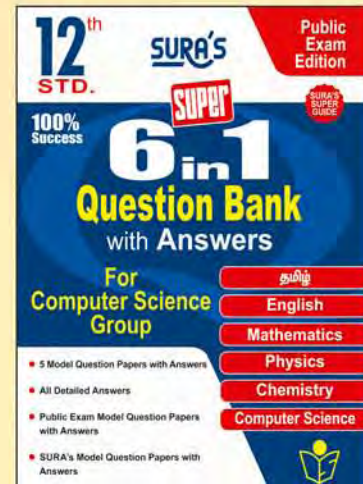- SURA's Model Question Papers with Answers

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### பொதுத்தேர்வு மாதிரி வினாத்தாள் ①

**மொழிப்பாடம் - பகுதி I - தமிழ்**

பதிவு எண்

கால அளவு : 3.00 மணி நேரம் ]    (வினாத்தாள் விடைகளுடன்)    [ மொத்த மதிப்பெண்கள் : 90

**அறிவுரைகள் :** (1) அனைத்து வினாக்களும் சரியாகப் பதிவாகி உள்ளதா என்பதனைச் சரிபார்த்துக் கொள்ளவும், அச்சுப்பதிவில் குறையிருப்பின், அறைக் கண்காணிப்பாளரிடம் உடனடியாகத் தெரிவிக்கவும்.

(2) **நீலம்** அல்லது **கருப்பு** மையினை மட்டுமே எழுதுவதற்கும், அடிக்கோடிடுவதற்கும் பயன்படுத்த வேண்டும்.

**குறிப்பு :** விடைகள் தெளிவாகவும், குறிப்பிட்ட அளவினதாகவும், சொந்த நடையிலும் அமைதல் வேண்டும்.

### பகுதி - I

**அனைத்து வினாக்களுக்கும் விடை தருக.**        [14 × 1 = 14]

1. சிற்பி பாலசுப்பிரமணியத்தின் 'இளந்தமிழே' பாடல் இடம் பெற்ற நூல் :
   அ) மஸ்னவி                ஆ) நிலவுப் பூ
   இ) காவ்யதர்சன்          ஈ) துறைமுகம்

2. "காவினெம் கலனே; சுருக்கினெம் கலப்பை" - இத்தொடரில் 'கலன்' உணர்த்தும் பொருள்
   அ) வேளாண் கருவி       ஆ) போர்க்கருவி
   இ) தச்சுக்கருவி          ஈ) இசைக்கருவி

3. மாதவி பெற்ற பட்டம் :
   அ) நாட்டியப் பேரொளி    ஆ) நர்த்தகி
   இ) தலைக்கோலி          ஈ) நாட்டியமயூரி

4. புயலுக்குப் பெயர் வைக்கும் கூட்டமைப்பு நாடுகள் :
   அ) பத்து நாடுகள்        ஆ) எட்டு நாடுகள்
   இ) ஐந்து நாடுகள்
   ஈ) பதினெட்டு நாடுகள்

5. த.ந. சற்குணரின் உரையைக் கேட்டுத் தூண்டப்பெற்று மயிலை சீனி. வேங்கடசாமி எழுதிய நூல் :
   அ) கிறித்துவமும் தமிழும்
   ஆ) பௌத்தமும் தமிழும்
   இ) இசுலாமும் தமிழும்
   ஈ) சமணமும் தமிழும்

6. இராமலிங்க அடிகள் இயற்றிய நூல் :
   அ) திருவருட்பா          ஆ) திருவாசகம்
   இ) திருக்குறள்          ஈ) திருமந்திரம்

7. 'காய்நெல்' - இச்சொல்லுக்கான இலக்கணக் குறிப்பு:
   அ) உம்மைத்தொகை       ஆ) பண்புத்தொகை
   இ) வினைத்தொகை        ஈ) உவமைத்தொகை

8. முதல் கல் - என்னும் சிறுகதையின் ஆசிரியர் :
   அ) குலோத்துங்கச் சோழன்
   ஆ) உத்தம சோழன்
   இ) இராசராச சோழன்
   ஈ) இராசேந்திர சோழன்

9. பிழையற்ற தொடரைக் கண்டறிக.
   அ) சென்னையிலிருந்து நேற்று வந்தான்.
   ஆ) கோவலன் மதுரைக்குச் சென்றது.
   இ) பறவைகள் நெல்மணிகளை வேகமாகக் கொத்தித் தின்றது.
   ஈ) குதிரையும் யானையும் வேகமாக ஓடியது.

10. சுரதா நடத்திய கவிதை இதழ்:
    அ) விண்மீன்            ஆ) இலக்கியம்
    இ) காவியம்            ஈ) ஊர்வலம்

11. 'பொய்யா வானம்' - இலக்கணக் குறிப்பு தருக.
    அ) ஈறுகெட்ட எதிர்மறைப் பெயரெச்சம்
    ஆ) வினைத்தொகை
    இ) உரிச்சொல் தொடர்
    ஈ) பெயரெச்சத் தொடர்

12. அருங்கானம் - புணர்ச்சி விதி தருக.
    அ) ஈறுபோதல், தன் ஒற்று இரட்டல்
    ஆ) ஈறுபோதல்
    இ) ஈறுபோதல், இனமிகல்
    ஈ) ஈறுபோதல், முன்னின்ற மெய்திரிதல்

13. மறைத்துச் சொல்லவும், மிகுத்துச் சொல்லவும், அழுத்திச் சொல்லவும் பயன்படும் இலக்கிய உத்தி எது?
    அ) தொன்மம்            ஆ) குறியீடு
    இ) படிமம்             ஈ) அங்கதம்

14. காப்பியம் எத்தனை வகைப்படும்?
    அ) மூன்று             ஆ) இரண்டு
    இ) நான்கு             ஈ) ஐந்து

### பகுதி - II - பிரிவு - 1

**எவையேனும் மூன்றனுக்கு விடை தருக.**        [3 × 2 = 6]

15. கவிஞர் சிற்பி எவற்றை வியந்து பாட, தமிழின் துணை வேண்டும் என்கிறார்?

16. விலங்குகளும் பறவைகளும் எவ்வாறு நடுங்கியதாக நக்கீரர் கூறுகிறார்?

17. வசனம், கவிதை - வேறுபாடு தருக.

18. வயலுக்குள் யானையைத் தனித்து விடுவதால் ஏற்படும் விளைவு யாது?

### பிரிவு - 2

**எவையேனும் இரண்டனுக்கு விடை தருக.**        [2 × 2 = 4]

19. புக்கில், தன்மானை - சிறு குறிப்பு வரைக.

20. சென்னையை அலங்கரித்த ஆறுகளை எழுதுக.

21. பின்னணி இசை, படத்தின் காட்சியமைப்புக்கு எவ்வாறு உயிரூட்டும்? சான்று தருக.

### பிரிவு - 3

**எவையேனும் ஏழனுக்கு விடை தருக.**        [7 × 2 = 14]

22. பேச்சு வழக்கை எழுத்து வழக்காக மாற்றுக.
    அ) இப்ப எனக்குப் புரிஞ்ச போச்சு, நீயும் புரிஞ்சிக்கோ.
    ஆ) வூட்டாண்ட வெளையாண்ட கொயந்தையை அப்பா எங்க இஸ்துகினு போனாரு?
    எலியும் பூனையும் போல

1

23. கீழ்க்காணும் சொல்லுருபுகளைப் பிரித்தும், சேர்த்தும் இருவேறு தொடர்களை அமைக்க.
அ) முன் ⟨　　　ஆ) தானே ⟨

24. பொருள் வேறுபாடறிந்து தொடர் அமைக்க.
தின்மை - திண்மை

25. தொடரில் உள்ள மரபுப் பிழைகளை நீக்கி எழுதுக.
அ) பனைமட்டையில் கூரை வைத்திருந்தனர்.
ஆ) வனவிலங்குக் காப்பகத்தில் சிங்கக் குட்டியும் யானைக்குட்டியும் கண்டேன்.

26. உவமைத் தொடர்களைச் சொற்றொடரில் அமைத்திடுக.
அ) அச்சாணி இல்லாத தேர் போல
ஆ) நகமும் சதையும் போல

27. வல்லின மெய்களை இட்டும் நீக்கியும் எழுதுக.
அ) நம் வாழ்க்கையின் தரம் நமது கவனத்தின் தரத்தை பொறுத்திருக்கிறது.
ஆ) புத்தகம் படிக்கும் பொழுது கூர்ந்த கவனம் அறிவை பெறுவதற்கும் வளர்ப்பதற்கான அடிப்படை தேவையாகும்.

28. ஏதேனும் ஒன்றனுக்குப் பகுத உறுப்பிலக்கணம் தருக.
அ) அமர்ந்தனன்　　ஆ) செய்த

29. ஏதேனும் ஒன்றனுக்குப் புணர்ச்சி விதி தருக.
அ) எத்திசை　　ஆ) செந்தமிழே

30. ஈரசைச் சீர்கள் எத்தனை? அவை யாவை?

**பகுதி - III - பிரிவு - 1**
எவையேனும் இரண்டனுக்கு விடை தருக.　　[2 × 4 = 8]

31. "ஏங்கொலி நீர் ஞாலத்து இருளகற்றும்" - இடம் சுட்டிப் பொருள் விளக்கம் தருக.

32. அதிசயமலரில் பூச்செடி எவ்வாறு முளைத்துள்ளதாக தமிழ்நதி கூறுகிறார்?

33. அதியமானின் ஈகைப் பண்பை சிறுபாணாற்றுப்படை வழிநின்று விளக்குக.

34. நாட்டிய அரங்கின் அமைப்பை இளங்கோவடிகள் காட்சிப்படுத்தும் பாங்கு குறித்து எழுதுக.

**பிரிவு - 2**
எவையேனும் இரண்டனுக்கு விடை தருக.　　[2 × 4 = 8]

35. கலைமுழுமை என்றால் என்ன? விளக்குக.

36. பேரிடர் மேலாண்மை வாரியம் - விளக்குக.

37. சென்னை நகரின் போக்குவரத்து வளர்ச்சி குறித்து எழுதுக.

38. மயிலை சீனி. வேங்கடசாமி நினைவுச் சிறப்பிதழுக்குச் செய்திகள் உருவாக்கித் தருக.

**பிரிவு - 3**
எவையேனும் மூன்றனுக்கு விடை தருக.　　[3 × 4 = 12]

39. ஏகதேச உருவக அணி (அல்லது) தொழில் உவமை அணியைச் சான்றுடன் விளக்குக.

40. பாடாண் திணையைச் சான்றுடன் விளக்குக.

41. அம்மூவனார், தலைமகன் பாங்கனுக்கு உரைத்ததாகக் கூறுவன யாவை?

42. பின்வரும் பழமொழியை வாழ்க்கை நிகழ்வில் அமைத்து எழுதுக.
அ) ஊழி பெயரினும் தாம் பெயரார் (அல்லது)
ஆ) கூடி வாழ்ந்தால் கோடி நன்மை

43. கருத்துப் படத்தைப் புரிந்து கொண்டு பத்தியாக எழுதுக.
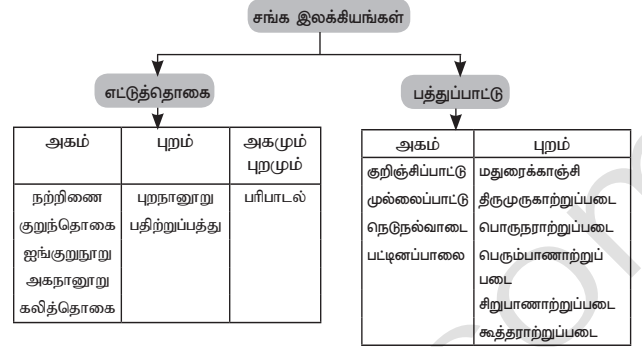


**பகுதி - IV**　　[3 × 6 = 18]

44. அ) செய்ந்நன்றியறிதலே அறம் என்பதை வாயுறை வாழ்த்தின் துணை கொண்டு நிறுவுக.
(அல்லது)
ஆ) எச்.ஏ. கிருட்டிணனார் 'கிறித்துவக் கம்பர்' என்பதை நும் பாடப்பகுதி வழி நிறுவுக.

45. அ) 'நெகிழி தவிர்த்து நிலத்தை நிமிர்த்து' என்னும் தலைப்பில் சுற்றுச்சூழல் ஆர்வலர் பசுமைதாசனுடன் நீங்கள் நடத்திய கற்பனைக் கலந்துரையாடல் கருத்துகளைத் தொகுத்து எழுதுக.
(அல்லது)
ஆ) சங்ககால கல்வெட்டை அறிந்துகொள்ள புகழ்ச் கல்வெட்டு எவ்வகையில் துணைபுரிகிறது? விளக்குக.

46. அ) 'சாலை விபத்தில்லாத் தமிழ்நாடு' - இக்கூற்று நனவாக நாம் செய்ய வேண்டியன யாவை?
(அல்லது)
ஆ) 'நடிகர் திலகம்' என்ற பட்டம் சிவாஜிக்குப் பொருத்தமானதே என்பதை நிறுவுக.

**பகுதி - V**
அடிமாறாமல் செய்யுள் வடிவில் எழுதுக.　　[4 + 2 = 6]

47. அ. 'துன்பு உளது' - எனத் தொடங்கும் கம்பராமாயணப் பாடலை அடிபிறழாமல் எழுதுக.
ஆ. 'செயல்' என முடியும் குறள்.

**விடைகள்**

1. ஆ) நிலவுப் பூ
2. ஈ) இசைக்கருவி
3. இ) தலைக்கோலி
4. ஆ) எட்டு நாடுகள்
5. அ) கிறித்துவமும் தமிழும்
6. அ) திருவருட்பா
7. இ) வினைத்தொகை
8. ஆ) உத்தம சோழன்
9. அ) சென்னையிலிருந்து நேற்று வந்தான்.
10. இ) காவியம்
11. அ) ஈறுகெட்ட எதிர்மறைப் பெயரெச்சம்

12. இ) ஈறுபோதல், இனமிகல்

13. ஆ) குறியீடு

14. ஆ) இரண்டு

15. (i) கடினமான வேலைகளைச் செய்யும் தொழிலாளர்களின் கைகள், மாலை நேரத்தில் சூரியனின் செந்நிறக் கதிர்களால் சிவந்திருக்கிற வானத்தைப் போல் சிவந்து காணப்படும்.

(ii) தொழிலாளர்களின் வியர்வை வெள்ளம் அவர்களின் பருத்த தோள் மீது முத்துகள் சிதறியது போன்று காணப்படும். இவற்றையெல்லாம் வியந்து பாட, தமிழின் துணை வேண்டும் என்று கவிஞர் சிற்பி கூறுகிறார்.

16. குளிர் மிகுதியால், விலங்குகள் மேய்ச்சலை மறந்தன; குரங்குகள் உடல் குறுகிக் கிடந்தன; மரங்களில் இருந்து பறவைகள் நிலத்தில் வீழ்ந்தன; பால் குடிக்க வரும் கன்றுகளை பசுக்கள் உதைத்துத் தள்ளின. இவ்வாறாக பறவைகள், விலங்குகள் குளிர் மிகுதியால் நடுங்கியதாக நக்கீரர் கூறுகிறார்.

17.

| வசனம் | கவிதை |
|---|---|
| எதுகை, மோனை நயங்கள் இல்லாமல், அடியளவை அறிந்திடாமல் எழுதுகின்ற எளிய வடிவமே **வசனம்** ஆகும். | யாப்பிலக்கண விதிகளுக்கு உட்பட்டு சீர், அசை, தளை, அடி, தொடை பாவகை இவற்றைக் கொண்டு இயற்றுவது 'கவிதை' ஆகும். |

18. யானையானது வயலில் தனித்து விடுவதால் அது உண்ணும் நெல்லின் அளவை விட, அதன் கால்களால் மிதிபட்டு அழியும் நெல்லின் அளவு அதிகமாக இருக்கும்.

19. **புக்கில்:** தற்காலிகமாக தங்குமிடம் புக்கில் என்று புறநானூறு குறிப்பிட்டுள்ளது.
**தன்மனை:** திருமணத்திற்குப் பின் கணவனும், மனைவியும் பெற்றோரிடமிருந்து பிரிந்து, தனியாக வாழுமிடம் தன்மனை என்று சங்க இலக்கியம் குறிப்பிட்டுள்ளது.

20. கொற்றலையாறு, கூவம், அடையாறு, பாலாறு.

21. பின்னணி இசை, திரைப்படத்தின் உணர்வுகளை வெளிக்கொண்டு வந்து காட்சி அமைப்பிற்கு உயிருட்டுகிறது.

**சான்று :** ஒரு பெண் சன்னல் வழியாக தெருவைப் பார்த்துக் கொண்டிருக்கிறாள். அப்போது ஒரு மகிழுந்து புறப்பட்டுச் செல்லும் ஒலி இணைக்கப்படுகிறது. தெருவோ மகிழுந்தோ காட்டப்படவில்லை. ஒலியின் குறிப்பிலிருந்து அவளைப் பார்க்க வந்தவர் புறப்பட்டுவிட்டதை அறிய முடிகிறது.

22. அ) இப்பொழுது எனக்குப் புரிந்துவிட்டது. நீயும் புரிந்துகொள்.

ஆ) வீட்டருகில் விளையாடிய குழந்தையை அப்பா எங்கே அழைத்துச் சென்றார்?

23. அ) முன் - அவன் முன்வந்து கூறினான்.
அவன்முன் வந்து கூறினான்.

ஆ) தானே - கண்ணன் தானே எல்லாப் பணிகளையும் செய்தான்.
கண்ணன்தானே எல்லாப் பணிகளையும் செய்தான்.

24. பிறர்க்குத் **தின்மை** செய்வதை நிறுத்தி அவர்களின் மனத்**திண்மை**யை உயர்த்து.
(தின்மை - தீமை, திண்மை - உறுதி)

25. அ) பனை **ஓலையால்** கூரை **வேய்ந்திருந்தனர்.**

ஆ) வனவிலங்குக் காப்பகத்தில் சிங்கக் **குருளையும்** யானைக் **கன்றும்** கண்டேன்.

26. அ) சான்றோரின் வழிகாட்டுதல் இல்லை என்றால் **அச்சாணி இல்லாத தேர்போல** மக்கள் நல்வழியில் செல்ல இயலாமல் துன்புறுவர்.

ஆ) கமலாவும் கீதாவும், **நகமும் சதையும் போல** இணை பிரியாத தோழிகளாக இருந்தார்கள்.

27. அ) நம் வாழ்க்கையின் தரம் நமது கவனத்தின் தரத்தைப் பொறுத்திருக்கிறது.

ஆ) புத்தகம் படிக்கும்பொழுது கூர்ந்த கவனம் அறிவைப் பெறுவதற்கும் வளர்ப்பதற்குமான அடிப்படைத் தேவையாகும்.

28. அ) அமர்ந்தனன் - அமர் + த்(ந்) + த் +அன் +அன்
அமர் - பகுதி
த் - சந்தி (ந் ஆனது விகாரம்)
த் - இறந்தகால இடைநிலை
அன் - சாரியை
அன் - ஆண்பால் வினைமுற்று விகுதி

ஆ) **செய்த – செய் + த் + அ**
செய் - பகுதி
த் - இறந்தகால இடைநிலை
அ - பெயரெச்ச விகுதி

29. அ) **எத்திசை – எ + திசை**
விதி: எ + திசை – 'இயல்பினும் விதியினும் நின்ற உயிர்முன் கசதப மிகும்' என்ற விதிப்படி எ + த் + திசை என்றாகி 'எத்திசை' என்று புணர்ந்தது.

ஆ) **செந்தமிழே – செம்மை + தமிழே**
விதிகள்: செம்மை + தமிழே
'**ஈறு போதல்**' விதிப்படி 'மை' விகுதி கெட்டு 'செம் + தமிழே' என்றானது. '**முன்னின்ற மெய் திரிதல்**' என்ற விதிப்படி வருமொழியின் முதல் எழுத்தான 'த' விற்கு இனமான 'ந்' என்ற எழுத்து தோன்றி 'செந்தமிழே' என்றானது.

30. ஈரசை சீர்கள் இரண்டு வகைப்படும். அவை மாச்சீரும், விளச்சீரும். (தேமா, புளிமா; கூவிளம், கருவிளம்).

31. **இடம் :** 'தண்டியலங்காரம்' என்ற அணியிலக்கண நூலில் பொருளணியில் இந்த அடியானது இடம் பெற்றுள்ளது.

**பொருள் :** மலைகளுக்கு இடையே தோன்றி, சான்றோர்களால் (உயர்ந்தோர்) வணங்கப்படுகின்ற கதிரவன், ஓசை நிறைந்த கடல் நீரால் சூழப்பட்டுள்ள இந்த உலகத்தின் புற இருளை நீக்குகிறது.

**விளக்கம் :** மலையில் தோன்றி சான்றோரால் வணங்கப்படுகின்ற, இருளைப் போக்குகின்ற பொருள்கள் இரண்டு உள்ளன. ஒன்று மின்னலைப்போல் ஒளிர்கின்ற கதிரவன். மற்றொன்று பொதிகைமலையில் தோன்றி, வளர்ந்த, மக்களின் அறியாமை என்னும் இருளைப் போக்குகின்ற தனக்கு நிகரில்லாத தமிழாகும்.

**12ஆம் வகுப்பு**

### சுராவின் மாதிரி வினாத்தாள் ④
### மொழிப்பாடம் - பகுதி I - தமிழ்

பதிவு எண்

கால அளவு : 3.00 மணி நேரம் ]     (வினாத்தாள் விடைகளுடன்)     [ மொத்த மதிப்பெண்கள் : 90

அறிவுரைகள் :  (1) அனைத்து வினாக்களும் சரியாகப் பதிவாகி உள்ளதா என்பதனைச் சரிபார்த்துக் கொள்ளவும். அச்சுப்பதிவில் குறையிருப்பின், அறைக் கண்காணிப்பாளரிடம் உடனடியாகத் தெரிவிக்கவும்.

(2) **நீலம்** அல்லது **கருப்பு** மையினை மட்டுமே எழுதுவதற்கும், அடிக்கோடிடுவதற்கும் பயன்படுத்த வேண்டும்.

குறிப்பு :  விடைகள் தெளிவாகவும், குறிப்பிட்ட அளவினதாகவும், சொந்த நடையிலும் அமைதல் வேண்டும்.

### பகுதி - I

அனைத்து வினாக்களுக்கும் விடை தருக.     [14 × 1 = 14]

1. "உவா உற வந்து கூடும்
உடுபது இரவி ஒத்தார்" - யார், யார்?
அ) சடாயு, இராமன்      ஆ) இராமன், குகன்
இ) இராமன், சுக்ரீவன்    ஈ) இராமன், சபரி

2. சங்க காலத்தில் கண சமூகத்துக்குத் தலைமை ஏற்றவர் :
அ) தாயே      ஆ) தந்தையே
இ) தலைவியே   ஈ) தலைவனே

3. பொருத்தி விடை தேர்க.
அ) தமிழ் அழகியல் - 1. பரலி.சு.நெல்லையப்பர்
ஆ) நிலவுப்பூ - 2. தி.சு.நடராசன்
இ) கிடை - 3. சிற்பி பாலசுப்பிரமணியம்
ஈ) உய்யும் வழி - 4. கி.ராஜநாராயணன்
அ) 4, 3, 2, 1       ஆ) 1, 4, 2, 3
இ) 2, 4, 1, 3       ஈ) 2, 3, 4, 1

4. 'முதல் கல்' சிறுகதை உணர்த்தும் கருத்து :
அ) ஊர் இரண்டுபட்டால் கூத்தாடிக்குக் கொண்டாட்டம்
ஆ) தனி மரம் தோப்பாகாது.
இ) தான் ஆடாவிட்டாலும் தன் தசை ஆடும்.
ஈ) மாற்றம் ஒன்றே மாறாதது.

5. மதராசப்பட்டினம் என்று அழைக்கப்பட்ட பகுதிகள் ............
அ) வடசென்னைப் பகுதிகள்
ஆ) தென் சென்னைப் பகுதிகள்
இ) மத்திய சென்னைப் பகுதிகள்
ஈ) இவை மூன்றும்

6. வெள்ளச் சமவெளிகள் அழியக் காரணம் ............
அ) பருவநிலை மாற்றம்
ஆ) மணல் அள்ளுதல்
இ) பாறைகள் இல்லாமை
ஈ) நிலத்தடி நீர் உறிஞ்சப்படுதல்

7. பிழையான தொடரைக் கண்டறிக:
அ) காளைகளைப் பூட்டி வயலை உழுதனர்.
ஆ) மலைமீது ஏறிக் கல்வெட்டுகளைக் கண்டறிந்தனர்.
இ) காளையில் பூத்த மல்லிகை மனம் வீசியது.
ஈ) நெற்பயிர்கள் மழைநீரில் மூழ்கின.

8. யார்? எது? ஆகிய வினாச்சொற்கள் பயனிலையாக அமைந்து உணர்த்தும் திணைகள் முறையே.........
அ) அஃறிணை, உயர்திணை
ஆ) உயர்திணை, அஃறிணை
இ) விரவுத்திணை, அஃறிணை
ஈ) விரவுத்திணை, உயர்திணை

9. "தனிக்குறில் முன் ஒற்று உயிர்வரின் இரட்டும்" - என்னும் புணர்ச்சி விதிக்குச் சான்று :
அ) செம்மண்      ஆ) எத்திசை
இ) பூம்பாவாய்    ஈ) உள்ளொன்று

10. வெண்பாவிற்குரிய ஓசை ................
அ) செப்பலோசை      ஆ) அகவலோசை
இ) துள்ளலோசை     ஈ) தூக்கலோசை

11. பொருள் குழப்பமின்றி எழுதுவதற்குரிய காரணங்களுள் பொருந்துவதைத் தேர்க.
அ) தேவையான இடங்களில் இடைவெளிவிடாமல் எழுதுதல்
ஆ) தேவையற்ற இடங்களில் இடைவெளிவிட்டு எழுதுதல்
இ) நிறுத்தற்குறிகளை உரிய இடங்களில் இட்டு எழுதுதல்
ஈ) வல்லினமெய்களைத் தேவையான இடங்களில் இடாமல் எழுதுதல்

12. படிமம் என்பதன் பொருள் ..............
அ) பொருள்      ஆ) செயல்
இ) காட்சி       ஈ) ஒலி

13. 2014-இல் சாகித்திய அகாதெமி விருதுபெற்ற 'அஞ்ஞாடி' புதினத்தின் ஆசிரியர் .........
அ) உத்தமச்சோழன்
ஆ) பூமணி
இ) தோப்பில் முகமது மீரான்
ஈ) சாந்தா தத்

14. 'முத்து முத்தாய்' என்பதன் இலக்கணக் குறிப்பு .........
அ) பண்புத்தொகை
ஆ) அடுக்குத்தொடர்
இ) வினையெச்சம்
ஈ) உருவகம்

## பகுதி - II

### பிரிவு - 1

**எவையேனும் மூன்றனுக்கு விடை தருக.** [3 × 2 = 6]

15. "தலையசைத்து உதறுகிறது
    மீதமான சொட்டுக்களை ஈரமான மரங்கள்" - பாடல்
    வரிகள் இடம் பெற்ற நூல் எது? ஆசிரியர் யார்?

16. 'எத்திசையிலும் சோறு தட்டாது கிட்டும் - யாருக்கு?

17. சினத்தை ஏன் காக்க வேண்டும்?

18. முகம் முகவரியற்றுப் போனதற்கு சுகந்தி சுப்பிரமணியன்
    கூறும் காரணத்தை எழுதுக.

### பிரிவு - 2

**எவையேனும் இரண்டனுக்கு விடை தருக.** [2 × 2 = 4]

19. மனிதன் தன் பேராசை காரணமாக இயற்கை வளங்களைக்
    கடுமையாகச் சேதப்படுத்தியதன் விளைவை இன்று
    சந்தித்துக் கொண்டிருக்கிறான் - இரு தொடர்களாக்குக.

20. கீழ்த்திசை சுவடிகள் நூலகம் குறித்து எழுதுக.

21. மணலில் எழுதியது முதல் தற்காலம் வரை எழுதும்
    முறையில் ஏற்பட்டுள்ள மாற்றங்களைத் தொகுத்துரைக்க.

### பிரிவு - 3

**எவையேனும் ஏழனுக்கு விடை தருக.**

22. பொருளுணர்ந்து சொற்றொடரில் அமைத்தெழுதுக :
    களம்- கலம்

23. திருவளர்ச் செல்வன், திருவளர் செல்வன் - இவற்றில்
    சரியான தொடர் எது? அதற்கான இலக்கண விதி யாது?

24. வெண்பாவிற்குரிய தளைகள் யாவை?

25. 'மாந்தோப்பு வசந்தத்தின் பட்டாடை உடுத்தி இருக்கிறது'
    - இதில் எவ்வகைப் படிமம் வெளிப்படுகிறது?

26. 'பூம்பாவாய்' - பிரித்துப் புணர்ச்சி விதி கூறுக.

27. 'விம்முகின்ற' - உறுப்பிலக்கணம் தருக.

28. பேச்சுவழக்கை எழுத்து வழக்காக மாற்றுக. வூட்டாண்ட
    வெளையாண்ட கொயங்தையை அப்பா எங்க இஸ்துகினு
    போனாரு.

29. தொடரில் உள்ள பிழைகளை நீக்கி எழுதுக.
    அ)  ஒவ்வொரு வீடுகளிலும் நூலகம் உள்ளது.
    ஆ)  நான் சுடுதண்ணீரில் குளித்தேன்.

30. வல்லின மெய்களை இட்டு எழுதுக.
    அ)  பாடலை பாடினான்.
    ஆ)  தேருக்கு சென்றான்.

## பகுதி - III

**ஆறு வரிகளுக்கு மிகாமல் விடையளிக்கவும்.** [7 × 4 = 28]

### பிரிவு - 1

**எவையேனும் இரண்டனுக்கு விடை தருக.**

31. வாடைக்காலத்தில் கோவலர்கள் எவ்வாறு பாதுகாப்பைத்
    தேடினர்?

32. "மூன்றான காலம்போல் ஒன்று" - எவை? ஏன்?

33. இராமலிங்க அடிகள் கந்தவேளிடம் எத்தகையோர்
    உறவுவேண்டுமெனக் கேட்கிறார்?

34. வருபவர் எவராயினும் நன்றி செலுத்து
    - இடம் சுட்டிப் பொருள் விளக்குக.

### பிரிவு - 2

**எவையேனும் இரண்டனுக்கு விடை தருக.**

35. சங்கப்பாடல்களில் ஒலிக்கோலம் குறிப்பிடத்தக்க ஒரு
    பண்பாகும் - விளக்குக.

36. நீங்கள் ஆசிரியர்களானால், மாணாக்கரை அன்பினால்
    எவ்வகையில் நெறிப்படுத்துவீர்கள்?

37. அறிவின் நகரம் சென்னை என்பதற்கான சான்றுகள்
    நான்கு தருக.

38. மழைவெள்ளப் பாதிப்பிலிருந்து காத்துக் கொள்ளும்
    முன்னெச்சரிக்கை நடவடிக்கைகளைக் குறிப்பிடுக.

### பிரிவு - 3

**எவையேனும் மூன்றனுக்கு விடை தருக.**

39. பொருள் வேற்றுமை அணியைச் சான்றுடன் விளக்குக.

40. இலக்கிய நயம் பாராட்டுக. (மையக்கருத்துடன்
    எவையேனும் மூன்று நயங்கள் மட்டும்)
    பாலைவனம் சோலைவன மாக வேண்டும்
      பசுங்கிளிகள் அங்கிருந்து பாட வேண்டும்
    சாலைகளிற் பலதொழிலும் பெருக வேண்டும்
      சபைகளிலே தமிழெழுந்து முழங்க வேண்டும்
    சீலையுடை கதருடையாய்த் திகழ வேண்டும்
    தேசபக்தி செழித்தோங்கி வளர வேண்டும்
    வேலையில்லாத் திண்டாட்டம் ஒழிய வேண்டும்
      வெற்றியின் மேல்வெற்றி எமக்கெய்த வேண்டும்.
            - தேசிய விநாயகம் பிள்ளை.

41. பின்வரும் தலைப்புகளில் ஏதேனும் ஒன்றனுக்கு கவிதை
    புனைக. செந்தமிழ் (அல்லது) நிலா.

42. தமிழாக்கம் தருக.
    Periyar was not only a great social revolutionarist; he
    was something more than that. He is known as a great
    champion of the under privileged ; even in this sphere
    he was much more than that. His sphere of activity was
    very wide and when he took up any issue he went deep
    into it, understood all the aspects of it and did not rest
    until he had found a permanent solution to it. Communal
    differences in our society were deep - tooted and appeared
    to be permanent features of our society until Periyar came
    on the scene.

43. பழமொழியை வாழ்க்கை நிகழ்வுகளோடு தொடர்புபடுத்தி
    எழுதுக.
    சிறு துரும்பும் பல்குத்த உதவும்.
            (அல்லது)
    கற்றோர்க்குச் சென்ற இடமெல்லாம் சிறப்பு

## பகுதி - IV

**இருபக்கங்களுக்கு மிகாமல் விடை தருக.** [3 × 6 = 18]

44. கவிதை எழுத அறிய வேண்டுவனவாகச் சுரதா
    கூறுவனவற்றை விவரிக்க.

(அல்லது)

"செய்ந்நன்றியறிதலே அறம்" என்பதை வாயுறை வாழ்த்தின் துணை கொண்டு நிறுவுக.

**45.** மயிலையார் ஓர் 'ஆராய்ச்சிப் பேரறிஞர்' என்னும் கூற்றினைச் சான்றுகளுடன் கட்டுரைக்க.

(அல்லது)

மதராசப்பட்டினத்தில் உள்ள நான்கு பகுதிகளைப் பற்றி குறிப்பு வரைக.

**46.** பொறுப்புணர்ச்சியின்றி இருந்த ஊரைத் தன் பொறுப்புணர்வால் மாற்றிய மருதனின் பண்புநலத்தை 'முதல்கல்' சிறுகதை வழியே விளக்குக.

(அல்லது)

சாலை விபத்து ஏற்படுவதற்கான காரணங்களையும் அவற்றைத் தவிர்க்கும் வழிகளையும் எழுதுக.

## பகுதி - V

**47.** அழிமாறாமல் செய்யுள் வடிவில் எழுதுக.    [4 + 2 = 6]

அ. 'ஒங்கலிடை' - எனத் தொடங்கும் தண்டியலங்காரப் பாடல்.

ஆ. 'சினம்' என முடியும் குறட்பா.

## விடைகள்

1. இ) இராமன், சுக்ரீவன்
2. அ) தாயே
3. ஈ) 2, 3, 4, 1
4. ஆ) தனி மரம் தோப்பாகாது
5. அ) வடசென்னைப் பகுதிகள்
6. ஆ) மணல் அள்ளுதல்
7. இ) காளையில் பூத்த மல்லிகை மணம் வீசியது.
8. ஆ) உயர்திணை, அஃறிணை
9. ஈ) உள்ளொன்று
10. அ) செப்பலோசை
11. இ) நிறுத்தக்குறிகளை உரிய இடங்களில் இட்டு எழுதுதல்.
12. இ) காட்சி
13. ஆ) பூமணி
14. ஆ) அடுக்குத்தொடர்
15. பிறகொரு நாள் கோடை - அய்யப்ப மாதவன் கவிதைகள், அயப்ப மாதவன்.
16. கலைத்தொழில் வல்ல புலவர்களுக்கு, எத்திசை சென்றாலும் அத்திசையில் உணவு கிடைக்கும்.
17. ஒருவர் தன்னைத்தான் காத்துக்கொள்ள விரும்பினால், சினம் வாராமல் காத்துக் கொள்ள வேண்டும்; காக்காவிட்டால், சினம் நம்மையே அழித்துவிடும்.
18. (i) தனக்குள்ளே தன்னைத் தொலைத்த பின்பு தனது முகம் முகவரியற்றுப் போனது என்று சுகந்தி சுப்பிரமணியன் கூறுகிறார்.

19. (i) மனிதன் தன் பேராசை காரணமாக இயற்கை வளங்களைக் கடுமையாகச் சேதப்படுத்தினான்.

(ii) இறுக்கமான சூழலில் தன்னை சுருக்கிக் கொண்ட பின்பு, தனது அடையாளத்தை இழந்து விட்டதை இவ்வாறு அவர் குறிப்பிடுகிறார்.

(ii) அதன் விளைவை இன்று அவன் சந்தித்துக் கொண்டிருக்கிறான்.

20. (i) காலின் மெக்கன்சியின் தொகுப்புகளை அடிப்படையாகக் கொண்டு 1869-இல் உருவாக்கப்பட்ட நூலகம்.

(ii) இந்நூலகம் அரிய ஓலைச்சுவடிகள், தாள் சுவடிகள், புத்தகங்கள் எனப் பெரும் தொகுப்புகளைக் கொண்டது.

21. (i) பண்டைய காலத்தில் பிள்ளைகள் முதலில் மணலில் எழுதிப் பழகுவார்கள். அதனால் அவர்களுடைய எழுத்துகள் வரிசையாகவும், நன்றாகவும் இருந்தன.

(ii) எழுத்துகள் ஒன்றோடொன்று படாமல் வரிகோணாமல் பழைய காலத்தில் எழுதினார்கள். எழுத்துகளின் உருவங்கள் பல காலமாக மாறாமல் இருந்தன.

(iii) தற்காலத்தில் மாணாக்கர்களுக்கு எழுதும் பழக்கம் நன்றாக உண்டாக வேண்டுமென்று ஆசிரியர்கள் ஒவ்வொரு நாளும் அவர்களைத் தனித்தனியே ஏடுகளில் தாம் மேலே எழுதி அதைப்போல் எழுதிவரச் சொல்வார்கள்.

22. போர்க்களத்தில் புண்பட்ட வீரர்களுக்கு **கல**த்தில் நீர் தரப்பட்டது.

23. (i) திருவாளர் செல்வன் என்பதே சரியான தொடராகும்.

(ii) வினைத்தொகையில், வல்லினம் மிகாது.

24. **வெண்பாவிற்குரிய தளைகள் :**

(i) இயற்சீர்வெண்டளை

(ii) வெண்சீர் வெண்டளை

25. வினைப்படிமம்.

26. பூம்பாவாய் - பூ + பாவாய்
விதி - பூப்பெயர் முன் இனமென்மையும் தோன்றும்.

27. விம்முகின்ற - விம்மு + கின்று + அ
விம்மு - பகுதி
கின்று - நிகழ்கால இடைநிலை
அ - பெயரெச்ச விகுதி

28. வீட்டருகில் விளையாடிக் கொண்டிருந்த குழந்தையை அப்பா எங்கே இழுத்துக்கொண்டு போனார்?

29. அ) ஒவ்வொரு **வீட்டிலும்** நூலகம் உள்ளது.
ஆ) நான் **வெந்நீரில்** குளித்தேன்.

30. அ) பாடலைப் பாடினான்.
ஆ) தேருக்குச் சென்றான்.

31. (i) தாழ்வான பகுதிகளில் பெருகிய வெள்ளத்தை வெறுத்த, வளைந்த கோலையுடைய கோவலர்கள் எருமை, பசு, ஆடு ஆகிய நிரைகளை வேறு மேடான நிலங்களில் மேய விட்டனர்.

# English

**12** $^{th}$ **STD.**   PUBLIC EXAM MODEL QUESTION PAPER **1**

Register Number

## English

Time : 3.00 Hours          **(with Answer Key)**          Marks : 90

**Instructions :**

1. **Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.**

2. **Use Blue or Black ink to write and underline and pencil to draw diagrams.**

### Part - I

(i) **Answer all the questions.**          **(20×1=20)**

(ii) **Choose the most suitable answers from the given four alternatives and write the answers along with the corresponding option codes.**

**Choose the most appropriate synonyms for the underlined words in the following sentences.**

1. ........ then as trade **slackened** we went over.
   (a) commenced          (b) improved
   (c) continued          (d) reduced

2. ........ and no more humps to **tantalize** us with hopes of success.
   (a) attract          (b) disappoint
   (c) taunt          (d) encourage

3. You may ............ seeing your car pulled up by his **insolence** of office, feel that your liberty has been outraged.
   (a) rudeness          (b) greediness
   (c) laziness          (d) sloppiness

**Choose the most appropriate antonyms for the underlined words in the following sentences.**

4. One does not feel wise, brave or more **optimistic**.
   (a) realistic          (b) pessimistic
   (c) pragmatic          (d) naturalistic

5. He had a **malignant** tumour of the bone.
   (a) harmful          (b) moderate
   c) benign          (d) terminal

6. She was a very **frail** girl.
   (a) strong     (b) brilliant (c) wealthy     (d) modern

7. Choose the correct American English word for **'pavement'**.
   (a) pedestal    (b) scaffold (c) pavilion    (d) sidewalk

8. Form a derivative by adding a suitable prefix to the rootword **'belief'**.
   (a) mis__          (b) dis__     (c) non__          (d) un__

9. Choose the word that cannot be added after **'over'** to form a compound word.
   (a) piece          (b) board     (c) flow          (d) coat

10. The study of principles of beauty is _____.
    (a) Numismatics
    (b) Aesthetics
    (c) Phonetics          (d) Linguistics

11. A person who is unable to pay his debts is a _____.
    (a) traitor          (b) bankrupt
    (c) tyrant          (d) convict

12. Choose the right word to replace the phrasal verb in the following sentence.
    On hearing the shocking news, the woman **passed out**.
    (a) trembled  (b) wailed   (c) perspired  (d) fainted

13. Choose the suitable meaning of the idiom in the following sentence.
    The medical shop is **round the corner**.
    (a) in the farthest end          (b) near the junction
    (c) at a short distance          (d) around the traffic circle

14. Choose the most appropriate word from the given confusables and fill in the blank.
    The astronomers recently _____ a new planet in our solar system.
    (a) invented          (b) discovered
    (c) diagnosed          (d) investigated

15. Choose the right plural form of the word **'apparatus'**.
    (a) apparatuses          (b) apparati
    (c) apparatusis          (d) apparaties

16. Choose the appropriate expansion of the acronym **'PAN'**.
    (a) Personal Aggregate Number
    (b) Private Authentic Number
    (c) Postal Assurance Number
    (d) Permanent Account Number

17. Choose the appropriate links from the following sentence.
    _____ my father arrived home, I narrated the incident.
    (a) As soon as          (b) Besides
    (c) If          (d) Although

18. Fill in the blanks with appropriate <u>article</u>.

    I am _____ eldest in the family.

    (a) an				(b) the

    (c) a				(d) none of the above

19. Identify the pattern of the following sentence.

    The child hid his toy car under the cot.

    (a) SVOA			(b) SVCA

    (c) SVOC			(d) SVIODO

20. Fill in the blank with the most suitable <u>preposition</u>.

    The sun faded _____ a stir of mist.

    (a) upon		(b) behind	(c) among		(d) during

## Part - II

## Section - 1

**Read the following sets of poetic lines and answer the questions that follow. Choose any 4 sets.				(4×2=8)**

21. *"We watched the mowers in the hay."*

    (a) Who does 'we' refer to ?

    (b) What work do the mowers do ?

22. *"The giant wears the scarf, and flowers are hung."*

    (a) Who is the giant here?

    (b) Mention the figure of speech used in this line.

23. *"The Marshal's in the market-place*
    *And you'll be there anon."*

    (a) Where does the soldier ask Napoleon to go ?

    (b) Why does he want the emperor to go there?

24. *"Then the whining school-boy, with his satchel*
    *And shining morning face, creeping like snail"*

    (a) What is a 'satchel'?

    (b) Identify the figure of speech used here.

25. *"Life is a soft loam; be gentle; go easy."*

    (a) Explain the comparison made here.

    (b) Pick out the words in alliteration.

26. *"For some three suns to store and hoard myself,*
    *And this gray spirit yearning in desire."*

    (a) Explain"three suns".

    (b) Who speaks these words ?

## Section - 2

**Answer any three Questions.			(3×2=6)**

27. Vivek is taking the kids on a picnic today. (Change the voice)

28. The curator of the museum said to the visitors, "Don't touch these paintings, please." (Change into indirect speech)

29. You should sleep well, otherwise you will ruin your health. (Change into complex using 'unless')

30. A young lady sold me this gold chain. I want to meet her. (Combine using the relative pronoun 'who')

## Part - III

## Section - 1

**Explain any two of the following with reference to the context.				(2×3=6)**

31. "He works his work, I mine."

32. "O sweet companions, loved with love intense,
    For your sakes, shall the tree be ever dear."

33. "Brutes have been gentled where lashes failed."

## Section - 2

**Answer any two of the following in not more than 30 words.				(2×3=6)**

34. Describe the appearance of Nicola and Jacopo.

35. What injuries did the Barnard couple sustain in the accident?

36. Why did Hillary become clumsy-fingered and slow-moving?

## Section - 3

**Answer any three of the following.	(3×3=9)**

37. Describe the process of cleaning the salt-stained and slippery floor tiles in your washroom.

38. A tenant is facing an acute water scarcity. He meets the landlord to explain the situation and request him to address the problem. Frame a dialogue between the tenant and the landlord discussing the issue.

39. Write a slogan for each of the following.

    (a) to advertise a fairness cream.

    (b) to create awareness on the importance of educating girl child.

    (c) to advertise a baby food product.

40. Complete the proverbs with the right options.

    (a) The squeaky wheel gets the _____.

        (i) diesel		(ii) resin	(iii) grease	(iv) water

    (b) People who live in glass houses should not throw _____.

        (i) pellets		(ii) stones	(iii) garbage	(iv) marbles

    (c) The _____ is always greener on the other side.

        (i) brook		(ii) parrot	(iii) moss		(iv) grass

## Part - IV

**Answer the following.**                    (7×5=35)

41. Answer the following in a **paragraph** of about **150 words**.

    (a) Enumerate the eleven golden rules to be followed to prepare a perfect cup of tea, as suggested by George Orwell.

    **(OR)**

    (b) How does A.G. Gardiner distinguish between individual liberty and social freedom through his essay 'On the Rule of the Road'?

42. Answer the following in a **paragraph** of about **150 words**.

    (a) How does Shakespeare describe the seven different roles played by man during his life-time?

    **(OR)**

    (b) Bring out the qualities of the young French soldier as portrayed by the poet in "Incident of the French Camp".

43. Answer the following in a **paragraph** of about **150 words**, by developing the given hints.

    (a) Aksionov - young merchant of Vladimir - lives with family - goes to Nizhny fair - meets a merchant friend - during travel - stays in an inn - leaves inn before daybreak - gets arrested - innocent prisoner - accused of murder - spends 26 years in prison - meets Makar - Aksionov saves Makar - Makar feels guilty - confesses his Crime - Aksionov forgives criminal- dies peacefully.

    **(OR)**

    (b) Ausable - secret agent - in his room - criminal enters - holds a pistol - Ausable turns anxious - wants to save - important documents - spins a clever story - uses presence of mind - makes Max believe - presence of balcony - someone knocks door - Ausable says - called police to safeguard papers - Max gets terrified - jumps out - gets killed.

44. (a) **Summarize** the following passage in about 100 words.

    The three fundamental essentials for existence of man in this planet are food, clothing and shelter. In pre-historic times, human beings dwelt in caves to protect and shield themselves from wild animals and harsh weather conditions. In the course of evolution, man developed the ability to build his own shelters in convenient locations using the materials available locally. The concept of fabricated permanent shelters thus came into being. The term 'shelter' as a basic necessity is perceived differently by different people. People house themselves in different types of shelters based on the preferred geographical locations, climate, affordability, job or business based compulsions and availability of desired facilities and infrastructure. In remote Northern Polar Regions, people live in shelters made of ice blocks called 'igloos'. In deep jungles, the tribes live in stilted houses constructed out of materials available in the forest. In plains, people live in villages, suburbs and cities, where a multitude variety of need-based shelters are constructed. Most of the people in villages live in individual houses that are self-containing. In suburbs, people live in bungalow type houses in areas connected by roads and provided with basic amenities. In cities, we find people residing in individual houses as well as multi-storeyed buildings. The individual units in the multi-storeyed buildings are known as apartments. Here people share all common amenities and utilities. Gated communities are also formed, wherein a big cluster of individual houses are enclosed in an exclusive area with access control. People at times temporarily stay in farm houses for rest and relaxation. They stay there to manage cultivation and farming activities as well. Some people reside in ranch houses in order to monitor and take care of vast stretches of private lands that are usually not fenced. Man has thus learnt not only to put a roof over his head but also in a way that suits all his needs.

    **(OR)**

    (b) Write the paragraph of about 150 words on the topic "The Importance of Personal Hygiene".

45. (a) Write a letter to the Headmistress of your school, requesting her to grant you to fee concession. Give reasons to support your application.

    **(OR)**

    (b) Write a letter to your friend, whose mother is admitted in hospital for a heart surgery.

46. (a) **Read the following poem and answer the questions given below.**

    Gods are happy in their heaven,
    When women are honoured upon the earth,
    Not it is a favour for them,
    But to respect their merit alone.

    Their hopes do live in dreams at night,
    To make them true in broad day-light,
    They don't have any sign in sight,
    This is in fact their miserable plight.

    Women are holy by their birth,
    Sacred are their ways of life,
    In pious ways they spare their time,
    Serving, God through serving all.

If women are fearless, frank and free,
And lead a simple and humble life,
And treated with a sense of love,
This world will turn a heaven indeed!

### Questions :

(i) When, according to the poet, do Gods in heaven feel happy?

(ii) What is considered as the miserable plight of women?

(iii) Why does the poet call the life of women sacred?

(iv) How can this world be transformed into a heaven?

(v) Suggest a suitable title to the poem.

**(OR)**

(b) **Develop the hints** into a story of about **150 words**.

An unhappy King - subjects very lazy - wants to teach - lesson - places a big stone - middle of a busy road - people pass - no one removes stone - stays there - one whole week - curse the King and Government - King orders soldiers - roll the stone aside - front of public - people find box - full of gold coins - a note reads - "gift to the one who removes stone" - people hang heads down - feel ashamed - King blames people - laziness and sense of irresponsibility.

47. (a) **Spot the errors in the following sentences and correct them suitably.**

(i) No sooner did the actor enter the stage, when the audience shouted in excitement.

(ii) Let's change the curtains today, can we?

(iii) Everyone know that smoking is injurious to health.

(iv) We have decided to follow an uniform system of appraisal.

(v) The sparrow is one of the most smallest birds I have seen.

(b) **Fill in the blanks appropriately :**

(i) The children remained _____ for _____ some time. (quite / quiet)

(ii) My parents _____ never _____ (beat) me so far. (use the correct tense form of the verb)

(iii) I _____ not violate the traffic rules at any cost. (use a semi-modal verb)

(iv) The manager congratulated the team members _____ the Management. (use a suitable prepositional phrase)

### Answers

1. (d) reduced
2. (c) taunt
3. (a) rudeness
4. (b) pessimistic
5. (c) benign
6. (a) strong
7. (d) sidewalk
8. (a) **mis**belief
9. (a) piece
10. (b) Aesthetics
11. (b) bankrupt
12. (d) fainted
13. (c) at a short distance
14. (b) discovered
15. (a) apparatuses
16. (d) Permanent Account Number
17. (a) As soon as
18. (b) the
19. (a) SVOA
20. (b) behind
21. (a) The word 'We' refers to the soldiers.
    (b) The mowers will trim the grass and level the lawns.
22. (a) The casuarina tree is the giant here.
    (b) **Personification.** (The tree wears a scarf. Human attitude is given to the tree).
23. (a) The soldier asks Napoleon to go the German city, Ratisbon.
    (b) He wants the emperor to go there because the French army has conquered Ratisbon.
24. (a) 'Satchel' means a shoulder bag.
    (b) **'Simile'.** The boy's movement is directly compared, using the word, **"like"**.
25. (a) Life is compared to a fertile soil. We can make our life fruitful, if we sow gentleness and take life as it comes.
    (b) Alliterated words : **L**ife, **l**oam.
26. (a) The meaning of "Three suns" is three years. The king of Ithaca says that staying there for 3 years is a waste of time.
    (b) Ulysses, the King of Ithaca speaks these words.
27. The kids are being taken on a picnic by Vivek today.
28. The curator of the museum **requested** the visitors **not to** touch **those** paintings.

29. **Unless** you sleep well, you will ruin your health.

30. I want to meet **the** young lady, **who** sold me this gold chain.

31. *Reference* : This line is taken from the poem 'Ulysses' written by Alfred Tennyson.

    *Context* : Ulysses has confidence that his son Telemachus fulfils his duties towards his subjects.

    *Explanation* : Ulysses is happy that his son would do his work blamelessly and he would pursue his quest for travel and knowledge. His son has the will to civilize the civilians in a tender way. Ulysses will do his work that his search for adventure.

32. *Reference* : This line is taken from the poem 'Our Casuarina Tree' by Toru Dutt.

    *Context* : The tree is dear to the poet, Toru Dutt, because she had spent happy moments under it with her siblings. She has brought out the theme of nature as something that shares feelings with humans, that lightens the burden on the heart.

    *Explanation* : The poet feels that the tree is dear to her not for its impressive appearance but for the nostalgic memories of her happy childhood that it brings to her.

33. *Reference* : This line is taken from the poem 'A Father to his Son' written by Carl August Sandburg.

    *Context* : The poet tells that humbleness and gentle nature can do wonder.

    *Explanation* : The poet insists that if we are gentle, we can make our life fruitful. At times gentleness overtakes harshness.

34. The elder boy was wearing an old damaged Jersey and cut-off Khaki pants. The other boy was slim and was wearing a shortened army tunic gathered in loose folds. Both of them had uncombed hair and brown skin. Nicola, the elder, was 13 years old and Jacopo was 12 years old .

35. Dr. Barnard had eleven broken ribs and a perforated lung. His wife had a badly fractured shoulder.

36. Hillary became clumsy-fingered and slow-moving because his oxygen was getting exhausted.

37. **Process of cleaning the salt-stained and slippery floor tiles.**

    We have to use bleaching powder or soda ash on a regular basis for cleaning the washroom's floor. After taking precautionery measures, such as covering our nose with face mask and wearing hand gloves, we have to spray strong acid on the floors. After few minutes, scrapping/scrubbing of the floor has to be carried out. After that, flushing with slightly alkaline water helps maintain the surface clean and sparkling.

38. Tenant : Good morning, sir. There is an acute water scarcity in your building.

    Landlord : What can I do for the water scarcity? There is no rain at all.

    Tenant : You can increase the depth of the current bore which is around 150 feet.

    Landlord : I have to see whether it is possible to increase the depth in the existing bore.

    Tenant : The houses, just beside our house, have got water at 500 feet depth.

    Landlord : O.K. I will arrange to dig a new bore with 500 feet depth, if deepening the existing bore is not possible.

    Tenant : Thank you.

39. (a) For whiter and brighter skin.
    (b) Educate a girl and empower the nation.
    (c) A power that grows your Child.

40. (a) (iii) grease          (b) (ii) stones
    (c) (iv) grass

41. (a) 'A Nice Cup of Tea' by George Orwell is a discussion of the craft of making a cup of tea. The author gives eleven golden rules to prepare tea. First, he begins to insist on using an Indian or Ceylonese Tea, to feel wiser, braver and more optimistic. Tea should be made in small quantities in a China or earthenware. The pot should be warmed beforehand. Tea should always be strong and it should be put straight into the teapot. We should take the teapot to the kettle and after making tea, one should stir it well. Tea should be drunk out of a cylindrical type of cup, as it holds more tea. Milk that is too creamy always gives the tea, a sickly taste. So we should pour the cream off the milk. Next, one should pour tea into the cup first. Lastly, he says that we should drink tea without sugar. These are the controversial points to arise in connection with tea drinking.

    **(OR)**

# 12$^{th}$ STD.

## SURA'S MODEL QUESTION PAPER ⑤

Register Number

## English

Time : 3.00 Hours      **(with Answer Key)**      Marks : 90

## INSTRUCTIONS

1. **Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.**

2. **Use Blue or Black ink to write and underline and pencil to draw diagrams.**

### Part - I

Answer all the questions.      (20 × 1 = 20)

**Choose the correct synonyms for the underlined words from the options given.**

1. Nicola was glaring at his young brother in **vexation**.
   a) Approval      b) Appreciation
   c) Annoyance      d) Admiration

2. Suffering seems so cruelly **prevalent** in the world today.
   a) Common      b) Scarce
   c) Abundant      d) Meagre

3. Seeing your car pulled up by his **insolence** of office, feel that your liberty has been outraged.
   a) Calmness      b) Rudeness
   c) Closeness      d) Attraction

**Choose the correct antonyms for the underlined words from the options given.**

4. Let me state **unequivocally** that Tamil is one of the greatest classical literatures and traditions of the world.
   a) Ambiguously      b) Clearly
   c) Unmistakably      d) Undoubtedly

5. China tea has virtues, which are not to be **despised**.
   a) Hated      b) Loath
   c) Averted      d) Liked

6. One night, we came upon them in the windy and **deserted** square.
   a) Inhabited      b) Unoccupied
   c) Crowded      d) Shrouded

7. Choose the correct combination for the compound word **"clear cut"**.
   a) Adjective + Verb      b) Gerund + Noun
   c) Noun + Noun      d) Noun + Verb

8. Choose the correct expansion of **GDP**.
   a) Gross Domestic Product
   b) Gross Domestic Purchase
   c) Great Demand for Purchase
   d) Great Domestic Purchase

9. Choose the meaning of the foreign word in the sentence. English is the **Lingua Franca** of many countries.
   a) Mother tongue      b) Foreign language
   c) Unknown language      d) Common language

10. Choose the right combination for the blended word **"diplonomics"**.
    a) Diplo + economics      b) Diplomacy + economy
    c) Diplo + economy      d) Diplomacy + economics

11. Choose the clipped word for **"pianoforte"**.
    a) Fort    b) Pite    c) Piano    d) Piaforte

12. 'Study of codes' is called _____.
    a) Cynology      b) Cryptology
    c) Criminology      d) Cytology

13. Form a derivative by adding the right prefix to the word **"argue"**.
    a) Contra    b) Counter    c) Bi    d) Pre

14. Fill in the blanks with a suitable relative pronoun. He _____ hesitates is lost.
    a) whose    b) whom    c) who    d) that

15. Fill in the blanks with a suitable preposition. Here is the watch that you asked _____.
    a) of      b) from
    c) for      d) at

16. Choose the correct question tag for the following statement. Let's go to the beach _____?
    a) don't we      b) do we
    c) shall we      d) didn't we

17. Choose the suitable meaning of the idiom found in the following sentence.
    When asked to reconsider his decision, he **put his foot down**.
    a) Accepted      b) Refused
    c) Felt happy      d) Grew angry

18. Substitute the underlined word with the appropriate polite alternative.
    She is a **fat** woman.
    a) Bulky      b) Obese
    c) Full-figured      d) Heavy weight

19. Choose the correct sentence pattern for the following sentence.

The Headmaster sent the latecomer out.

a) S V C A              b) S V O A

c) S V O C              d) S V IO DO

20. Fill in the blank with a suitable phrasal verb.

Prajeeth is _____ a placement in Australia.

a) longing on          b) longing to

c) longing for         d) longing of

## Part - II

## Section - 1

**Read the following sets of poetic line and answer any four from it.          (4 × 2 = 8)**

21. *"Our gates are strong, our walls were thick,*
    *So smooth and high, no man could win"*

    a) How safe was the castle?

    b) What was the firm belief of the soldier?

22. *"A creeper climbs, in whose embrace bound*
    *No other tree could live."*

    a) Which tree is referred to in the above lines?

    b) How does the tree survive the tight hold of the creeper?

23. *"Then the whining school boy, with his satchel*
    *And shining morning face, creeping like snail Unwillingly to school."*

    a) Which state of life is being referred to here by the poet?

    b) What are the characteristics of this stage?

24. _____ *for my purpose holds.*
    *To sail beyond the sunset, and the baths*
    *Of all the western stars, until I die.*

    a) What was Ulysses' purpose in life?

    b) How long would his venture last?

25. *"Let him have lazy days seeking his deeper motives*
    *Let him seek deep for where he is born natural"*

    a) Why does the son need lazy days?

    b) What is the figure of speech used here?

26. *'A film the mother eagle's eye*
    *When her bruised eaglet breathes'*

    a) Who is compared to the mother eagle in the above lines?

    b) What are the alliterated words?

## Section - 2

**Answer any three of the following questions.          (3 × 2 = 6)**

27. The pilot said to the passengers, "The plane will land in Delhi at 9 p.m." (change into Direct speech)

28. Professor Usha is not only a writer but an orator. (Change the voice)

29. Rewrite the sentence making an inversion in the conditional clause.

    If I had a car, I would drop you.

30. I watched a fantastic movie

    (Change the following into a complex sentence).

## Part - III

## Section - 1

**Explain any two of the following with reference to the context.          (2 × 3 = 6)**

31. "They seemed no threat to us at all".

32. "Jealous in honour, sudden and quick in quarrel, seeking the bubble reputation".

33. "I'm killed, Sire!" And, his Chief beside, Smiling, the boy fell dead.

## Section - 2

**Answer any two of the following questions in about 30 words each.          (2 × 3 = 6)**

34. What were the various jobs undertaken by Nicola and Jacopo?

35. How did the hospitalization of Dr. Barnard and his wife affect their routine?

36. Define liberty as perceived by A.G. Gardiner.

## Section - 3

**Answer any three of the following questions.          (3 × 3 = 9)**

37. Write a slogan on each of the following topics.
    (a) Environment Day
    (b) Water Conservation
    (c) Junk Food

38. Write a dialogue of minimum 3 exchanges between a student and a cultural secretary.

39. Describe the process of preparing onion raita.

40. Complete the proverbs using the word given below.

    a) Brevity is the _____ of wit. (base, soul, root)

    b) _____ alone triumphs. (Truth, God, Love)

    c) A man is known by the _____ he keeps. (company, neighbour, relatives)

## Part - IV

**Answer the following questions.  (7 × 5 = 35)**

**Answer in a paragraph in about 150 words.**

41. (a) Justify the title of the story "Two gentlemen of Verona".

    (OR)

    (b) How does George L. Hart justify the statement that Tamil is a classical language?

42. (a) Describe the various stages of a man's life picturised in the poem "All the World's a Stage".

    (OR)

    (b) The young soldier matched his emperor in courage and patriotism. Elucidate your answer.

43. Write the paragraph in about 150 words by developing the following hints.

    (a) Ivan Dimitrich Aksionov - merchant in Vladimir - prone to drinking - goes to fair on business - meets another merchant - retire separately - stopped by the police - charged of murder and robbery - sentenced and sent to Siberia - 26 years in jail - new prisoner Maker Semyonich - admits his crime - Aksionv dies.

    (OR)

    (b) Group of school children - planet Venus raining for seven years - predicted sun - for two hours - children in activity - Margot thin girl - not mingling - children locked her in a closet - sun appeared - children played - rain clouds appeared - unlocked the closet - Margot came out - power of sun.

44. (a) Write a summary (or) make notes of the following passage.

    The aim of education is to enable the human personality to grow to its full stature. We have a body, a mind and a spirit. Accordingly, education aims at our physical, intellectual, spiritual and moral development.

    Games are a means of keeping the body healthy and fit. Physical fitness and freedom from all kinds of ailments are the desire and ambition of every human being. Indeed, good health is the first condition of happiness in life. Those who play games generally maintain good health. Games are an excellent means of bodily exercise. Whether it is sophisticated games like hockey, football and tennis or simple games like Kabaddi, they provide the much needed exercise to the body and thus keep the body healthy and strong. Players always have a better appetite and a better digestion than those who play no games or do exercises. Games not only make the body healthy and strong, but also make it muscular.

    (OR)

    (b) Write a Paragraph about "My Dream House".

45.

(a) You have got a job offer for the post of clerk at Cheyyar Constructions Pvt. Ltd, Mount Road, Chennai - 2, but cannot join on time due to some urgent work at home. Write a letter to the HR (Human Resource) Manager of that company, and in your letter

    say why you are writing,

    explain your situation,

    what you want to request from Manager. (Write XXX for your name and YYY for your address).

    (OR)

(b) Write a paragraph of 150 words on "Newspaper Reading".

46.

(a) Spot the errors and rewrite the sentence correctly.

    a)  He gave a lot of advices.

    b)  I have finished my meals.

    c)  They discussed about politics.

    d)  Though he is ill, but he attends the class.

    e)  If they had contacted me. I would help them.

    (OR)

(b) Fill in the blanks correctly.

    a) I can't _____ the heat, if I walk on _____ foot. (bare, bear)

    b) _____ you excuse me for a moment? (Use a modal verb)

    c) You _____ not lose any more weight. You are already slim. (Use a semi-modal verb)

    d) My brother _____ (buy) a bike recently. (Use a proper tense)

47.

(a) Write a letter to your cousin congratulating him / her on being declared the best sportsperson of his / her college.

    (OR)

(b) Read the following passage and answer the questions in your own words.

    Kabbadi is a contact team sport that originated in Tamil Nadu. It is the national sport of Bangladesh. Kabbadi is played between two teams of seven players, the

# Mathematics

**12th STD**

**PUBLIC EXAM MODEL QUESTION PAPER** ①

Reg. No.

TIME ALLOWED : 3.00 Hours ]     Part - III
**Mathematics** (with answers)    [ MAXIMUM MARKS : **90**

**Instructions :**

1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

2. Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams

## PART - I

**Note :** (i) Answer all the questions. **[20 × 1 = 20]**

     (ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

**1.** The value of $\int_{0}^{2/3} \dfrac{dx}{\sqrt{4-9x^2}}$ is :

   (1) $\pi$      (2) $\dfrac{\pi}{6}$

   (3) $\dfrac{\pi}{2}$      (4) $\dfrac{\pi}{4}$

**2.** The distance between the planes $x + 2y + 3z + 7 = 0$ and $2x + 4y + 6z + 7 = 0$ is

   (1) $\dfrac{7}{2\sqrt{2}}$      (2) $\dfrac{\sqrt{7}}{2\sqrt{2}}$

   (3) $\dfrac{7}{2}$      (4) $\dfrac{\sqrt{7}}{2}$

**3.** The position of a particle moving along a horizontal line of any time $t$ is given by $s(t) = 3t^2 - 2t - 8$. The time at which the particle is at rest, is

   (1) $t = 3$      (2) $t = 0$

   (3) $t = \dfrac{1}{3}$      (4) $t = 1$

**4.** If $u(x, y) = e^{x^2 + y^2}$, then $\dfrac{\partial u}{\partial x}$ is equal to:

   (1) $y^2 u$      (2) $e^{x^2 + y^2}$

   (3) $2xu$      (4) $x^2 u$

**5.** The vertex of the parabola $x^2 = 8y - 1$ is

   (1) $\left(0, \dfrac{1}{8}\right)$      (2) $\left(-\dfrac{1}{8}, 0\right)$

   (3) $\left(\dfrac{1}{8}, 0\right)$      (4) $\left(0, \dfrac{1}{8}\right)$

**6.** If $\rho(A) = \rho([A \mid B])$, then the system $AX = B$ of linear equations is :

   (1) inconsistent
   (2) consistent and has a unique solution
   (3) consistent
   (4) consistent and has infinitely many solutions

**7.** If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then $B^{-1} =$

   (1) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$      (2) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$

   (3) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$      (4) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$

**8.** The least possible perimeter (in meter) of a rectangle of area $100$ m$^2$ is :

   (1) 50    (2) 10    (3) 20    (4) 40

**9.** A polynomial equation of degree $n$ always has:

   (1) exactly $n$ roots    (2) $n$ distinct roots
   (3) $n$ real roots      (4) $n$ imaginary roots

**10.** arg (0) is:

   (1) $\infty$      (2) 0

   (3) $\pi$      (4) undefined

**11.** Subtraction is not a binary operation in :

   (1) $\mathbb{Q}$    (2) $\mathbb{R}$    (3) $\mathbb{Z}$    (4) $\mathbb{N}$

**12.** The radius of the circle $3x^2 + by^2 + 4bx - 6by + b^2 = 0$ is

   (1) $\sqrt{11}$      (2) 1

   (3) 3      (4) $\sqrt{10}$

81

**13.** The order of the differential equation of all circles with centre at $(h, k)$ and radius '$a$' where $h$, $k$ and $a$ are arbitrary constants, is :

(1)  1     (2)  2     (3)  3     (4)  4

**14.** A random variable X has binomial distribution with $n = 25$ and $p = 0.8$, then the standard deviation of X is:

(1)  2            (2)  6

(3)  4            (4)  3

**15.** $\vec{r} = s\,\hat{i} + t\,\hat{j}$ is the equation of ($s$, $t$ are parameters) :

(1)  $zox$ plane

(2)  a straight line joining the points $\hat{i}$ and $\hat{j}$

(3)  $xoy$ plane

(4)  $yoz$ plane

**16.** The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is :

(1)  0          (2)  $1 + i$

(3)  $i$          (4)  1

**17.** The value of $\int_0^\pi \sin^4 x\, dx$ is :

(1)  $\dfrac{3\pi}{2}$     (2)  $\dfrac{3\pi}{10}$

(3)  $\dfrac{3\pi}{8}$     (4)  $\dfrac{3\pi}{4}$

**18.** If $\sin^{-1} x + \sin^{-1} y = \dfrac{2\pi}{3}$; then $\cos^{-1}x + \cos^{-1}y$ is equal to :

(1)  $\pi$     (2)  $\dfrac{2\pi}{3}$

(3)  $\dfrac{\pi}{3}$     (4)  $\dfrac{\pi}{6}$

**19.** The order and degree of the differential equation $\dfrac{dx}{dy} + \dfrac{dy}{dx} = 0$ are:

(1)  2, degree not defined

(2)  1, 2

(3)  2, 1

(4)  2, 2

**20.** $\tan^{-1}\left(\dfrac{1}{4}\right) + \tan^{-1}\left(\dfrac{2}{9}\right) =$

(1)  $\tan^{-1}\left(\dfrac{1}{2}\right)$     (2)  $\dfrac{1}{2}\cos^{-1}\left(\dfrac{3}{5}\right)$

(3)  $\dfrac{1}{2}\sin^{-1}\left(\dfrac{3}{5}\right)$     (4)  $\dfrac{1}{2}\tan^{-1}\left(\dfrac{3}{5}\right)$

### PART - II

Note : Answer any seven questions.
     Question number 30 is compulsory.

**7 × 2 = 14**

**21.** Prove that $\left(\dfrac{1+i}{1-i}\right)^3 - \left(\dfrac{1-i}{1+i}\right)^3 = -2i$

**22.** If $(1 + i)(1 + 2i) \dots (1 + ni) = x + iy$, then prove that $2.5.10. \dots (1 + n^2) = x^2 + y^2$.

**23.** Find the value of $\sin^{-1}\left[\sin\left(\dfrac{5\pi}{4}\right)\right]$

**24.** Find the magnitude and the direction cosines of the torque about the point $(2, 0, -1)$ of a force $2\,\hat{i} + \hat{j} - \hat{k}$, whose line of action passes through the origin.

**25.** Find the value in the interval $\left(\dfrac{1}{2}, 2\right)$ satisfied by the Rolle's theorem for the function $f(x) = x + \dfrac{1}{x}, x \in \left[\dfrac{1}{2}, 2\right]$.

**26.** For the function $f(x) = x^2 + 3x$, calculate the differential $df$ when $x = 2$ and $dx = 0.1$

**27.** Prove that $\int_0^{\pi/2} \dfrac{f(\sin x)}{f(\sin x) + f(\cos x)}\, dx = \dfrac{\pi}{4}$.

**28.** Find he differential equation of the family of parabolas $y^2 = 4ax$, where '$a$' is an arbitrary constant.

**29.** Prove that the identity element is unique if it exists.

**30.** Find the equation of the parabola if the curve is open leftward, vertex is $(2, 1)$ and passing through the point $(1, 3)$.

## PART - III

Note : Answer any seven questions.
Question number 40 is compulsory.

$$7 \times 3 = 21$$

**31.** If $A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$ then prove that $(A^T)^{-1} = (A^{-1})^T$

**32.** If $p$ is real, discuss the nature of the roots of the equation $4x^2 + 4px + p + 2 = 0$, in terms of $p$.

**33.** A concrete bridge is designed as a parabolic arch. The road over bridge is 40 m long and the maximum height of the arch is 15 m. Write the equation of the parabolic arch. Take $(0, 0)$ as the vertex.

**34.** Find the Vector and Cartesian equation of a straight line passing through the points $(-5, 7, -4)$ and $(13, -5, 2)$. Find the point where the straight line crosses the $xy$-plane.

**35.** Find the critical numbers (only $x$ values) of the function $f(x) = x^{4/5}(x-4)^2$.

**36.** If $U = \log(x^3 + y^3 + z^3)$ then find $\dfrac{\partial U}{\partial x} + \dfrac{\partial U}{\partial y} + \dfrac{\partial U}{\partial z}$

**37.** A random variable X has the following probability mass function:

| X | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| P(x = x) | $k$ | $2k$ | $6k$ | $5k$ | $6k$ | $10k$ |

then find $P(2 < X < 6)$.

**38.** Let X be a continuous random variable and $f(x)$ is defined as:

$$f(x) = \begin{cases} kx(1-x)^{10}, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

**39.** Find the value of k. Prove that
$p \to q \equiv \neg p \lor q$.

**40.** If the lines $\dfrac{x-x_1}{l_1} = \dfrac{y-y_1}{m_1} = \dfrac{z-z_1}{n_1}$ and
$\dfrac{x-x_2}{l_2} = \dfrac{y-y_2}{m_2} = \dfrac{z-z_2}{n_2}$ lie on the same plane, then write number of ways to find the Cartesian equation of the above plane and explain in detail.

## PART - IV

Answer *all* questions.　　　　$$7 \times 5 = 35$$

**41.** (a) Test the consistency of the following system of linear equations by rank method.

$$x - y + z = -9$$
$$2x - y + z = 4$$
$$3x - y + z = 6$$
$$4x - y + 2z = 7$$

(OR)

(b) If $2\cos\alpha = x + \dfrac{1}{x}$ and $2\cos\beta = y + \dfrac{1}{y}$, show that:

(i) $\dfrac{x^m}{y^n} - \dfrac{y^n}{x^m}$ $2i\sin(m\alpha - n\beta)$

(ii) $x^m y^n + \dfrac{1}{x^m y^n} = 2\cos(m\alpha + n\beta)$

**42.** (a) Draw the graph of $\cos x$ in $[0, \pi]$ and $\cos^{-1} x$ in $[-1, 1]$.

(OR)

(b) Find the equation of the circle passing through the points $(1, 1)$, $(2, -1)$ and $(3, -2)$.

**43.** (a) Assume that water issuing from the end of a horizontal pipe, 7.5 m above the ground, describes a parabolic path. The vertex of the parabolic path is at the end of the pipe. At a position 2.5 m below the line of the pipe, the flow of water has curved outward 3 m beyond the vertical line through the end of the pipe. How far beyond this vertical line will the water strike the ground?

(OR)

(b) By vector method, prove that, $\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$.

**44.** (a) Find the vector and Cartesian equation of the plane passing through the point $(0, 1, -5)$ and parallel to the straight lines.

$$\vec{r} = \left(\hat{i} + 2\hat{j} - 4\hat{k}\right) + s\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right)$$

and $\vec{r}$ $\left(\hat{i} - 3\hat{j} + 5\hat{k}\right) + t\left(\hat{i} + \hat{j} - \hat{k}\right)$

(OR)

(b) Evaluate: $\displaystyle\int_{-\pi}^{\pi} \dfrac{\cos^2 x}{1 + a^x} \, dx$

**45.** (a) A police jeep, approaching an orthogonal intersection from the northern direction, is chasing a speeding car that has turned and moving straight east. When the jeep is 0.6 km north of the intersection and the car is 0.8 km to the east, the police determine with a radar that the distance between the jeep and the car is increasing at 20 km/hr. If the jeep is moving at 60 km/hr at the instant of measurement, what is the speed of the car?

(OR)

(b) Find the area of the region bounded by $x$-axis, the curve y = |cos $x$|, the lines $x = 0$ and $x = \pi$.

**46.** (a) A square shaped thin material with area 196 sq. units to make into an open box by cutting small equal squares from the four corners and folding the sides upward. Prove that the length of the side of a removed square is $\dfrac{7}{3}$ when the volume of the box is maximum

(OR)

(b) If F is the constant force generated by the motor of an automobile of mass M, its velocity V is given by $M\dfrac{dV}{dt} = F - kV$, where k is a constant. Prove that $V = \dfrac{F}{k}\left(1 - e^{\frac{-kt}{M}}\right)$ when $t = 0$ and $V = 0$.

**47.** (a) In an investigation, a corpse was found by a detective at exactly 8 p.m. Being alert, the detective also measured the body temperature and found it to be 70° F. Two hours later, the detective measured the body temperature again and found it to be 60°F. If the room temperature is 50°F, and assuming that the body temperature of the person before death was 98.6°F, prove that the time of death is 5.26 p.m. (5 hrs 26 minutes) (app.). $\left[\dfrac{\log(2.43)}{\log(2)} \simeq 1.28\right]$

(OR)

(b) Three fair coins are tossed once. Find the probability mass function, mean and variance for number of heads occurred. Verify the results by binomial distribution.

## ANSWERS

### PART - I

**1.** (2) $\dfrac{\pi}{6}$           **11.** (4) $\mathbb{N}$

**2.** (2) $\dfrac{\sqrt{7}}{2\sqrt{2}}$       **12.** (4) $\sqrt{10}$

**3.** (3) t = $\dfrac{1}{3}$       **13.** (3) 3

**4.** (3) 2$xu$       **14.** (1) 2

**5.** (4) $\left(0, \dfrac{1}{8}\right)$       **15.** (3) $xoy$ plane

**6.** (3) consistent       **16.** (2) $1 + i$

**7.** (2) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$       **17.** (3) $\dfrac{3\pi}{8}$

**8.** (4) 40       **18.** (3) $\dfrac{\pi}{3}$

**9.** (1) exactly $n$ roots       **19.** (2) 1, 2

**10.** (4) undefined       **20.** (1) $\tan^{-1}\left(\dfrac{1}{2}\right)$

### PART - II

**21.** We consider $\dfrac{1+i}{1-i} = \dfrac{(1+i)(1+i)}{(1-i)(1+i)} = \dfrac{1+2i-1}{1+1}$

$= \dfrac{2i}{2} = i$

and $\dfrac{1-i}{1+i} = \left(\dfrac{1+i}{1-i}\right)^{-1} = \dfrac{1}{i} = -i$

Therefore, $\left(\dfrac{1+i}{1-i}\right)^3 - \left(\dfrac{1-i}{1-i}\right)^3 = i^3 - (-i)^3$

$= -2i$

**22.** $|1 + i||1 + 2i||1 + 3i| .......|1 + ni| = |x + iy|$

$\sqrt{2}\ \sqrt{5}\ \sqrt{10}\ .......... \sqrt{1+n^2} = \sqrt{x^2 + y^2}$

Squaring, 2 5 10........(1 + $n^2$) = $x^2 + y^2$

**23.** $\sin^{-1}\left(\sin\left(\dfrac{5\pi}{4}\right)\right)$

$= \sin^{-1}\left(\sin\left(\pi + \dfrac{\pi}{4}\right)\right)\ \ \because \dfrac{5\pi}{4} \notin \left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right]$

$= \sin^{-1}\left(\sin\left(-\dfrac{\pi}{4}\right)\right) = -\dfrac{\pi}{4} \in \left[\dfrac{-\pi}{2}, \dfrac{\pi}{2}\right]$

**24.** Let A be the point $(2, 0, -1)$. Then the position vector of A is $\overrightarrow{OA} = 2\hat{i} - \hat{k}$ and therefore $\vec{r} = \overrightarrow{AO} = -2\hat{i} + \hat{k}$.

Then the given force is $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$ So, the torque is

$$\vec{t} = \vec{r} \times \vec{F} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -2 & 0 & 1 \\ 2 & 1 & -1 \end{vmatrix} = \hat{i} - 2\hat{k}$$

The magnitude of the torque $= |-\hat{i} - 2\hat{k}| = \sqrt{5}$ and the direction cosines of the torque are $-\dfrac{1}{\sqrt{5}}, 0, -\dfrac{2}{\sqrt{5}}$

**25.** We have $f(x)$ is continuous in $\left[\dfrac{1}{2}, 2\right]$ and differentiable in $\left(\dfrac{1}{2}, 2\right)$ with $f\left(\dfrac{1}{2}\right) = \dfrac{5}{2} = f(2)$.

By the Rolle's theorem there must exist a value $c \in \left(\dfrac{1}{2}, 2\right)$ such that

$f'(c) = 1 - \dfrac{1}{c^2} = 0 \Rightarrow c^2 = 1$ gives $c = \pm 1$. As $1 \in \left(\dfrac{1}{2}, 2\right)$, we choose $c = 1$.

**26.** Taking differentials,

$$df = (2x + 3)\, dx$$

When $x = 2, dx = 0.1$

$$df = (2(2) + 3)(0.1) = 7(0.1) = 0.7$$

**27.** Let I $= \displaystyle\int_0^{\pi/2} \dfrac{f(\sin x)}{f(\sin x) + f(\cos x)}\, dx$    ... (1)

Apply the formula

$\displaystyle\int_0^a f(x)dx = \int_0^a f(a-x)\, dx$ in eq (1), we get

$$\text{I} = \int_0^{\pi/2} \dfrac{f\left(\sin \dfrac{\pi}{2} - x\right)}{f\left(\sin \dfrac{\pi}{2} - x\right) + f\left(\cos \dfrac{\pi}{2} - x\right)}\, dx$$

$$\text{I} = \int_0^{\pi/2} \dfrac{f(\cos x)}{f(\cos x) + f(\sin x)}\, dx \qquad \text{... (2)}$$

$(1) + (2) \Rightarrow$

$$2\text{I} = \int_0^{\pi/2} \dfrac{f(\sin x)}{f(\sin x) + f(\cos x)}\, dx +$$

$$\int_0^{\pi/2} \dfrac{f(\cos x)}{f(\cos x) + f(\sin x)}\, dx$$

$$= \int_0^{\pi/2} \dfrac{f(\sin x) + f(\cos x)}{f(\sin x) + f(\cos x)}\, dx$$

$$= \int_0^{\pi/2} dx = [x]_0^{\pi/2} = \dfrac{\pi}{2}$$

$$2\text{I} = \dfrac{\pi}{2}$$

$$\text{I} = \dfrac{\pi}{4}$$

Thus proved

**28.** The equation of the family of parabolas is given by $y^2 = 4ax$, $a$ is an arbitrary constant.    ... (1)

Differentiating both sides of (1) with respect to $x$, we get $2y\dfrac{dy}{dx} = 4a \Rightarrow a = \dfrac{y}{2}\dfrac{dy}{dx}$

Substituting the value of $a$ in (1) and simplifying, we get $\dfrac{dy}{dx} = \dfrac{y}{2x}$ as the required differential equation.

**29.** Let $(S, *)$ be an algebraic structure. Assume that the identity element of S exists in S.

It is to be proved that the identity element is unique. Suppose that $e_1$ and $e_2$ be any two identity elements of S.

First treat $e_1$ as the identity and $e_2$ as an arbitrary element of S.

Then by the existence of identity property,

$e_2 * e_1 = e_1 * e_2 = e_2$    ... (1)

Interchanging the role of $e_1$ and $e_2$,

$e_1 * e_2 = e_2 * e_1 = e_1$    ...(2)

From (1) and (2), $e_1 = e_2$. Hence the identity element is unique which completes the proof.

**30.** Equation of the parabola which open left ward is

$$(y - k)^2 = -4a(x - h) \qquad \text{... (1)}$$

vertex $(h, k) = (2, 1)$

$\therefore$ (1) becomes

$$(y - 1)^2 = -4a(x - 2) \qquad \text{...(2)}$$

# 12th STD

## SURA'S MODEL QUESTION PAPER ⑤

Reg. No.

Part - III

**TIME ALLOWED :** 3.00 Hours ]    **Mathematics** (with answers)    [ **MAXIMUM MARKS : 90**

**Introductions :**

(a) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(b) Use Blue or Black ink to write and underline and pencil to draw diagrams

### PART - I

**Note :** (i) Answer all questions are **compulsory.**

(ii) Choose the most suitable answer from the given four correct alternatives and write the option code and the corresponding answer.    **[20 × 1 = 20]**

**1.** If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then $|adj\,(AB)| =$

(1) –40    (2) –80    (3) –60    (4) –20

**2.** Find the point on the curve $6y = x^3 + 2$ at which $y$-coordinate changes 8 times as fast as $x$-coordinate is

(1) (4,11)      (2) (4,−11)

(3) (−4,11)      (4) (−4,−11)

**3.** If $0 \le \theta \le \pi$ and the system of equations $x + (\sin\theta)y - (\cos\theta)z = 0$, $(\cos\theta)x - y + z = 0$, $(\sin\theta)x + y - z = 0$ has a non-trivial solution then $\theta$ is

(1) $\dfrac{2\pi}{3}$   (2) $\dfrac{3\pi}{4}$   (3) $\dfrac{5\pi}{6}$   (4) $\dfrac{\pi}{4}$

**4.** The principal argument of $(\sin 40° + i\cos 40°)^5$ is

(1) –110º      (2) –70º

(3) 70º      (4) 110º

**5.** The number given by the Mean value theorem for the function $\dfrac{1}{x}$, $x \in [1, 9]$ is

(1) 2    (2) 2.5    (3) 3    (4) 3.5

**6.** The value of $\left( \dfrac{1+\sqrt{3}i}{1-\sqrt{3}i} \right)^{10}$ is

(1) $\operatorname{cis} \dfrac{2\pi}{3}$      (2) $\operatorname{cis} \dfrac{4\pi}{3}$

(3) $-\operatorname{cis} \dfrac{2\pi}{3}$      (4) $-\operatorname{cis} \dfrac{4\pi}{3}$

**7.** If $f(x, y) = e^{xy}$, then $\dfrac{\partial^2 f}{\partial x \partial y}$ is equal to

(1) $xye^{xy}$      (2) $(1 + xy)e^{xy}$

(3) $(1 + y)e^{xy}$      (4) $(1 + x)e^{xy}$

**8.** If $x^3 + 12x^2 + 10ax + 1999$ definitely has a positive zero, if and only if

(1) $a \ge 0$      (2) $a > 0$

(3) $a < 0$      (4) $a \le 0$

**9.** The value of $\displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x \, dx$ is

(1) $\dfrac{3}{2}$   (2) $\dfrac{1}{2}$   (3) 0   (4) $\dfrac{2}{3}$

**10.** If $\sin^{-1} x + \cot^{-1}\left(\dfrac{1}{2}\right) = \dfrac{\pi}{2}$, then $x$ is equal to

(1) $\dfrac{1}{2}$      (2) $\dfrac{1}{\sqrt{5}}$

(3) $\dfrac{2}{\sqrt{5}}$      (4) $\dfrac{\sqrt{3}}{2}$

**11.** If $\displaystyle\int_0^a \dfrac{1}{4+x^2} dx = \dfrac{\pi}{8}$ then $a$ is

(1) 4    (2) 1    (3) 3    (4) 2

**12.** $\sin(\tan^{-1} x)$, $|x| < 1$ is equal to

(1) $\dfrac{x}{\sqrt{1-x^2}}$      (2) $\dfrac{1}{\sqrt{1-x^2}}$

(3) $\dfrac{1}{\sqrt{1+x^2}}$      (4) $\dfrac{x}{\sqrt{1+x^2}}$

**13.** The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

(1) $\dfrac{4}{3}$   (2) $\dfrac{4}{\sqrt{3}}$   (3) $\dfrac{2}{\sqrt{3}}$   (4) $\dfrac{3}{2}$

**14.** The order and degree of the differential equation $\dfrac{d^2 y}{dx^2} + \left(\dfrac{dy}{dx}\right)^{\frac{1}{3}} + x^{\frac{1}{4}}$ are respectively

(1) 2, 3    (2) 3, 3    (3) 2, 6    (4) 2, 4

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**15.** If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of $k$ is
(1) 3　　(2) –1　　(3) 1　　(4) 9

**16.** Consider an ellipse whose centre is of the origin and its major axis is along x-axis. If its eccentricity is $\dfrac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is
(1) 8　　(2) 32　　(3) 80　　(4) 40

**17.** On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is
(1) $\dfrac{11}{243}$　　　　(2) $\dfrac{3}{8}$
(3) $\dfrac{1}{243}$　　　　(4) $\dfrac{5}{243}$

**18.** The order and degree of $y' + (y'')^2 = (x + y'')^2$ are _____.
(1) 1, 1　(2) 1, 2　(3) 2, 1　(4) 2, 2

**19.**

| | List - I | | List - II |
|---|---|---|---|
| i. | V($b$) | a) | $a^2$ V(X) |
| ii. | V($ax$) | b) | 0 |
| iii. | V($x$) | c) | $a^2$ V(X) |
| iv. | V($aX + b$) | d) | E(X)$^2$ – [E(X)]$^2$ |

The Correct match is
　　(i)　(ii)　(iii)　(iv)
(1)　b　　d　　c　　a
(2)　c　　d　　a　　b
(3)　b　　c　　d　　a
(4)　d　　a　　b　　c

**20.** Which of the following are not statements?
(i)　$3 + 4 = 8$
(ii)　The sun is a planet
(iii)　Switch on the light
(iv)　Where are you going?
(1)　(i), (ii)
(2)　(ii), (iii)
(3)　(iii), (iv)
(4)　(iv) only

## PART - II

(i)　Answer any SEVEN questions.
(ii)　Question number 30 is compulsory.

**7 × 2 = 14**

**21.** Solve the following systems of linear equation by Cramer's rule :
$5x - 2y + 16 = 0$, $x + 3y - 7 = 0$

**22.** Find the slope of the tangent to the curves at the respective given points.
$x = a \cos^3 t$, $y = b \sin^3 t$ at $t = \dfrac{\pi}{2}$.

**23.** Find the values of the real numbers $x$ and $y$, if the complex numbers
$(3 - i)x - (2 - i)y + 2i + 5$ and $2x + (-1 + 2i)y + 3 + 2i$ are equal

**24.** Assume that the cross section of the artery of human is circular. A drug is given to a patient to dilate his arteries. If the radius of an artery is increased from 2 mm to 2.1 mm, how much is cross-sectional area increased approximately?

**25.** Solve the equation : $x^4 - 14x^2 + 45 = 0$.

**26.** Evaluate the following integrals using properties of integration :
$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(x^5 + x\cos x + \tan^3 x + 1\right) dx$$

**27.** Find all the values of $x$ such that $-5\pi \le x \le 5\pi$ and $\cos x = -1$.

**28.** Show that the following expressions is a solution of the corresponding given differential equation. $y = 2x^2$ ; $xy' = 2y$

**29.** Determine whether * is a binary operation on the sets given below. $a*b = a.|b|$ on $\mathbb{R}$.

**30.** Find a parametric form of vector equation of a plane which is at a distance of 7 units from the origin having $3, -4, 5$ as direction ratios of a normal to it.

## PART - III

(i)　Answer any **SEVEN** questions.
(ii)　Question number **40** is compulsory.

**7 × 3 = 21**

**31.** In a competitive examination, one mark is awarded for every correct answer while $\dfrac{1}{4}$ mark

is deducted for every wrong answer. A student answered 100 questions and got 80 marks. How many questions did he answer correctly ? (Use Cramer's rule to solve the problem).

**32.** Explain why Rolle's theorem is not applicable to the following functions in the respective intervals.

(i) $f(x) = \left| \dfrac{1}{x} \right|, x \in [-1, 1]$

(ii) $f(x) = \tan x, x \in [0, \pi]$

(iii) $f(x) = x - 2 \log x, x \in [2, 7]$

**33.** Find the least value of the positive integer $n$ for which $\left( \sqrt{3} + i \right)^n$ purely imaginary.

**34.** If $w(x, y) = x^3 - 3xy + 2y^2, x, y \in \mathbb{R}$, find the linear approximation for $w$ at $(1, -1)$.

**35.** Solve : $(2x - 1)(x + 3)(x - 2)(2x + 3) + 20 = 0$

**36.** Find the value of $\cot \left( \sin^{-1} \dfrac{3}{5} + \sin^{-1} \dfrac{4}{5} \right)$

**37.** Find an approximate value of $\displaystyle\int_{1}^{1.5} (2 - x) dx$ by applying the mid-point rule with the partition $\{1.1, 1.2, 1.3, 1.4, 1.5\}$.

**38.** Prove by vector method that if a line is drawn from the centre of a circle to the midpoint of a chord, then the line is perpendicular to the chord.

**39.** If $\mu$ and $\sigma^2$ are the mean and variance of the discrete random variable X , and $E(X + 3) = 10$ and $E(X + 3)^2 = 116$ , find $\mu$ and $\sigma^2$.

**40.** Find all real numbers satisfying $4^x - 3(2^{x+2}) + 2^5 = 0$

## PART - IV

Answer *all* questions.                    **7 × 5 = 35**

**41.** (a) Expand $\sin x$ in ascending powers $x - \dfrac{\pi}{4}$ upto three non-zero terms.

                    OR)

(b) By using Gaussian elimination method, balance the chemical reaction equation: $C_2H_6 + O_2H_2O + CO_2$

**42.** (a) Write in polar form of the following complex numbers. $\dfrac{i - 1}{\cos \dfrac{\pi}{3} + i \sin \dfrac{\pi}{3}}$

(OR)

(b) Use the linear approximation to find approximate values of

(i) $(123)^{\frac{2}{3}}$ (ii) $\sqrt[4]{15}$ (iii) $\sqrt[3]{26}$

**43.** (a) Solve the equation $x^3 - 9x^2 + 14x + 24 = 0$ if it is given that two of its roots are in the ratio 3:2.

(OR)

(b) Solve the equations : $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$

**44.** (a) Find the principal value of $\sec^{-1} \left( \dfrac{2}{\sqrt{3}} \right)$

(OR)

(b) Evaluate : $\displaystyle\int_{0}^{\frac{\pi}{\sqrt{2}}} \dfrac{dx}{5 + 4 \sin^2 x}$

**45.** (a) Find the equations of the tangent and normal to hyperbola $12x^2 - 9y^2 = 108$ at $\theta = \dfrac{\pi}{3}$. (Hint: use parametric form)

(OR)

(b) Solve the differential equation: $(x^3 + y^3) dy - x^2 y dx = 0$

**46.** (a) Using vector method, prove that if the diagonals of a parallelogram are equal, then it is a rectangle.

(OR)

(b) The probability density function of X is $f$

$(x) = \begin{cases} x & 0 < x < 1 \\ 2 - x & 1 \le x < 2 \\ 0 & \text{otherwise} \end{cases}$

Find

(i) $P(0.2 \le X < 0.6)$

(ii) $P(1.2 \le X < 1.8)$

(iii) $P(0.5 \le X < 1.5)$

**47.** (a) Verify whether the following compound propositions are tautologies or contradictions or contingency

(i) $(p \wedge q) \wedge \neg (p \vee q)$

(ii) $((p \vee q) \wedge \neg p) \rightarrow q$

(iii) $(p \rightarrow q) \leftrightarrow (\neg p \rightarrow q)$

(iv) $((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$

(OR)

(b) Parabolic cable of a 60m portion of the roadbed of a suspension bridge are positioned as shown below. Vertical Cables are to be spaced every 6m along this portion of the roadbed. Calculate the lengths of first two of these vertical cables from the vertex



# ANSWERS

## PART - I

1.  (2)  –80
2.  (1)  (4,11)
3.  (4)  $\dfrac{\pi}{4}$
4.  (1)  –110°
5.  (3)  3
6.  (1)  cis $\dfrac{2\pi}{3}$
7.  (2)  $(1 + xy)e^{xy}$
8.  (3)  $a < 0$
9.  (4)  $\dfrac{2}{3}$
10. (2)  $\dfrac{1}{\sqrt{5}}$
11. (4)  2
12. (4)  $\dfrac{x}{\sqrt{1+x^2}}$
13. (3)  $\dfrac{2}{\sqrt{3}}$
14. (3)  $\sqrt{10}$
15. (1)  2, 3
16. (4)  40
17. (1)  $\dfrac{11}{243}$
18. (3)  2, 1
19. (3)  i – b   ii – c   iii – d   iv – a
20. (3)  (iii), (iv)

## PART - II

21. Given $\Delta = \begin{vmatrix} 5 & -2 \\ 1 & 3 \end{vmatrix} = 15 + 2 = 17$

$\Delta_1 = \begin{vmatrix} -16 & -2 \\ 7 & 3 \end{vmatrix} = -48 + 14 = -34$

$\Delta_2 = \begin{vmatrix} 5 & -16 \\ 1 & 7 \end{vmatrix} = 35 + 16 = 51$

$x = \dfrac{\Delta_1}{\Delta} = \dfrac{-34}{17} = -2$

$y = \dfrac{\Delta_2}{\Delta} = \dfrac{51}{17} = 3$

Solution set is $\{-2, 3\}$

22. Given $x = a\cos^3 t$ ; $y = b\sin^3 t$

$\dfrac{dx}{dt} = -3a\cos^2 t \sin t$ ;

$\dfrac{dy}{dt} = 3b\sin^2 t \cot t$

$\dfrac{dy}{dx} = \dfrac{\dfrac{dy}{dt}}{\dfrac{dx}{dt}}$

$= \dfrac{3b\sin^2 t \cos t}{-3a\cos^2 t \sin t} = \dfrac{-b}{a}\tan t$

Slope of the tangent at $t = \dfrac{\pi}{2}$ is

$m = \left(\dfrac{dy}{dx}\right)_{t=\frac{\pi}{2}}$

$= \dfrac{-b}{a}\tan\dfrac{\pi}{2} = \dfrac{-b}{a} \times \infty = \infty$

$m = \infty$

23. Given $(3 -i) x - (2 - i) y + 2i + 5$
$= 2x + (-1 + 2i) y + 3 + 2i$
$\Rightarrow 3x - ix - 2y + iy + 2i + 5 = 2x - y + 2iy + 3 + 2i$
choosing the real and imaginary parts
$(3x -2y + 5) + i(-x + y + 2) = 2x - y + 3 + i(2y + 2)$
Equating the real and imaginary parts both sides, we get

$3x - 2y + 5 = 2x - y + 3$
$\Rightarrow 3x - 2y + 5 - 2x + y - 3 = 0$
$\Rightarrow x - y = -2$     ... (1)
$-x + y + 2 = 2y + 2$
$\Rightarrow -x + y + 2 - 2y - 2 = 0$
$\Rightarrow -x - y = 0 \Rightarrow x + y = 0$     ... (2)

(1) – (2) we get,

$x - y = -2$
$(-) \quad (-) \quad \quad (-)$
$x + y = 0$
―――――――――――
$\Rightarrow \quad -2y = -2$
$\Rightarrow \quad y = 1$

# Physics

**12th STD.**    **PUBLIC EXAM MODEL QUESTION PAPER** ❶

## PHYSICS

Register Number

TIME : 3.00 Hours

**(with Answers)**

MAXIMUM MARKS : 70

**Instructions :**

(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

### PART - I

**Note :**   (i) Answer all the questions:    (15 × 1 = 15)

    (ii) Choose the most appropriate answer from the given four alternatives and write the option code with the corresponding answer.

**1.** The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies as :

(a) $A^{\frac{5}{3}}$            (b) $A^{\frac{2}{3}}$

(c) $A^{\frac{4}{3}}$            (d) $A^{\frac{1}{3}}$

**2.** The radius of curvature of curved surface at a thin planoconvex lens is 10 cm and the refractive index is 1.5. If the plane surface is silvered then the focal length will be :

(a) 20 cm         (b) 5 cm

(c) 10 cm         (d) 15 cm

**3.** In Bohr Atom Model when the principal quantum number (n) increases the velocity of electrons :

(a) increases and then decreases

(b) increases

(c) decreases

(d) remains constant

**4.** Charging current for a capacitor is 0.2 A, find the displacement current.

(a) zero          (b) 0.2 A

(c) 0.4 A         (d) 0.1 A

**5.** A light of wavelength 500 nm is incident on a sensitive plate of photoelectric work function 1.235 eV. The kinetic energy of the photo electrons emitted is : (Take $h = 6.6 \times 10^{-34}$ Js)

(a) 1.16 eV       (b) 0.58 eV

(c) 2.48 eV       (d) 1.24 eV

**6.** Magnetic field at any point at a distance R due to a long straight conductor carrying current varies as :

(a) $R^2$           (b) R

(c) $\dfrac{1}{R^2}$         (d) $\dfrac{1}{R}$

**7.** Type of material which emits white light in LED :

(a) GaInN        (b) SiC

(c) AlGaP       (d) GaAsP

**8.** The frequency range of 30 MHz to 400 GHz is used for :
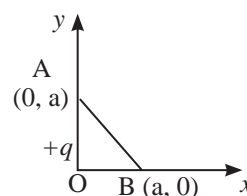
(a) Satellite communication

(b) Ground wave propagation

(c) Space wave propagation

(d) Sky wave propagation

**9.** The given electrical network is equivalent to :
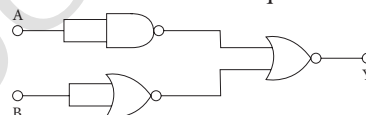


(a) NAND gate      (b) OR gate

(c) NOT gate       (d) Ex-OR gate

**10.** In the given diagram a point charge +q is placed at the origin O. Work done in taking another point charge –Q from point A to point B is :



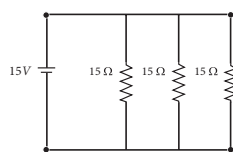(a) $\dfrac{qQ}{4\pi\varepsilon_0 a^2}\left(\dfrac{a}{\sqrt{2}}\right)$      (b) Zero

(c) $\left[\dfrac{-qQ}{4\pi\varepsilon_0}\dfrac{1}{a^2}\right]\sqrt{2a}$    (d) $\left[\dfrac{qQ}{4\pi\varepsilon_0}\dfrac{1}{a^2}\right]\sqrt{2a}$

**11.** In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic field is:

(a) Q            (b) $\dfrac{Q}{2}$

(c) $\dfrac{Q}{\sqrt{3}}$         (d) $\dfrac{Q}{\sqrt{2}}$

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**12.** The current in the circuit is :



(a) 4A                (b) 1 A

(c) 2A                (d) 3 A

**13.** Two light waves from slit $S_1$ and $S_2$ on reaching points P and Q on a screen in Young's double slit experiment have a path difference zero and $\dfrac{\lambda}{4}$ and respectively. The ratio of light intensities at P and Q will be :

(a) 4 : 1             (b) 3 : 2

(c) $\sqrt{2}$ : 1          (d) 2 : 1

**14.** A particle of mass m, carrying charge q is accelerated through a potential of V (Volt). When this accelerated charge comes under the influence of perpendicular magnetic field, the force acting on it is :

(a) $\sqrt{\dfrac{2q^3 BV}{m^3}}$          (b) $\sqrt{\dfrac{2q^3 BV}{m}}$

(c) $\sqrt{\dfrac{q^3 B^2 V}{2m}}$          (d) $\sqrt{\dfrac{2q^3 B^2 V}{m}}$

**15.** If voltage applied on a capacitor is increased from V and 2 V, choose the correct conclusion.

(a) Both Q and C remain the same

(b) Q remains the same, C is doubled

(c) Q is doubled, C is doubled

(d) C remains the same, Q is doubled

## Part - II

**Note : Answer any six questions. Question number 24 is compulsory:**   $(6 \times 2 = 12)$

**16.** What do you mean by doping?

**17.** What are the uses of X-rays?

**18.** An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed per turn of the secondary coil if the transformer is connected to a 230 V AC main.

**19.** Distinguish between Fresnel and Fraunhofer types of diffraction.

**20.** What is corona discharge?

**21.** What is skip area?

**22.** What are the properties of neutrino?

**23.** Two materials X and Y are magnetised whose intensity of magnetisation are 500 Am$^{-1}$ and 2000 Am$^{-1}$ respectively. The magnetising field is 1000 Am$^{-1}$. What is the ratio between the susceptibilities of the two material?

**24.** Why electron is preferred over X-ray in microscope?

## Part - III

**Note : Answer any six questions. Question number 33 is compulsory:**   $(6 \times 3 = 18)$

**25.** Explain the conversion of galvanometer into voltmeter.

**26.** The resistance of a nichrome wire at 0ºC is 10Ω. If its temperature coefficient of resistance is 0.004/ºC, find its resistance at boiling point of water. Comment on the result.

**27.** What are the important inferences from the average binding energy curve?

**28.** In the circuit shown in the figure, the input voltage $V_i$ is 20 V, $V_{BE} = 0$ V and $V_{CE} = 0$ V, what are the values of $I_B$, $I_C$ and β ?
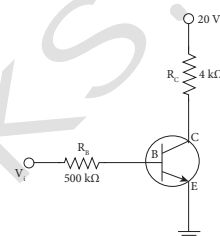


**29.** Derive the expression for equivalent capacitance, when capacitors are connected in parallel.

**30.** What are the advantages and disadvantages of AC over DC?

**31.** Two light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities.

**32.** Derive an expression for de-Broglie wavelength of electrons.

**33.** Modulation helps to reduce the antenna size in wireless communication - Explain.

## Part - IV

**Answer all the questions.**   $(5 \times 5 = 25)$

**34.** (a) Obtain the expression for the induced emf by changing relative orientation of the coil with the magnetic field. (Graph not necessary).

(OR)

(b) Derive the mirror equation and the equation for lateral magnification.

**35.** (a) Deduce the expression for the force between two long parallel current carrying conductors.

(OR)

(b) Write down maxwell equations in integral form.

**36.** (a) Describe Davisson - Germer experiment which demonstrated the wave nature of electrons.

(OR)

(b) (i) Derive an expression for the orbital energy of an electron in hydrogen atom using Bohr theory.

(ii) An electron in Bohr's hydrogen atom has an energy of – 3.4 eV. What is the angular momentum of the electron?

**37.** (a) Explain the working of the transistor as an oscillator.

(OR)

(b) Find out the phase relationship between voltage and current in a pure inductive circuit?

**38.** (a) State Gauss Law in electrostatics. Obtain an expression for Electric field due to an infinitely long charged wire.

(OR)

(b) How the emf of two cells are compared using potentiometer?

## ANSWERS

### Part - I

1. (b) $A^{\frac{2}{3}}$

2. (c) 10 cm

3. (c) decreases

4. (b) 0.2 A

5. (d) 1.24 eV

6. (d) $\dfrac{1}{R}$

7. (a) GaInN

8. (c) Space wave propagation    9. (b) OR gate

10. b) zero            11. (d) $\dfrac{Q}{\sqrt{2}}$

12. (d) 3A            13. (d) 2 : 1

14. (d) $\sqrt{\dfrac{2q^3 B^2 V}{m}}$

15. (d) C remains the same, Q is doubled

### Part - II

16. (i) The Process of adding impurities to the intrinsic semiconductor is called doping.

(ii) The impurity atoms are called dopants in 100 ppm.

17. (i) X-rays are used extensively in studying structures of inner atomic electron shells and crystal structures.

(ii) It is used in detecting fractures, diseased organs.

(iii) Used to detect formation of bones and stones, observing the progress of healing bones.

(iv) Further, in a finished metal product, it is used to detect faults, cracks, flaws and holes.

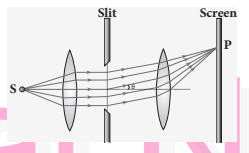18. $N_P = 460$ turns; $N_s = 40,000$ turns; $V_P = 230$ V
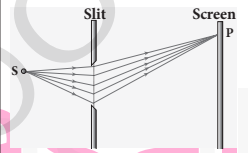
**To find :** Secondary voltage. (i.e) $V_s$

**Formula :** $\dfrac{V_S}{V_P} = \dfrac{N_S}{N_P}$

$V_s = \dfrac{V_P N_S}{N_P} = \dfrac{230 \times 40,000}{460} = 20,000\,\text{V}$

Secondary voltage per turn $= \dfrac{V_S}{N_S} = \dfrac{20,000}{40,000} = 0.5\,\text{V}$

19.

| | Fresnel diffraction | Fraunhofer diffraction |
|---|---|---|
| 1. | Spherical or cylindrical wavefront undergoes diffraction | Plane wavefront undergoes diffraction |
| 2. | Light wave is from a source at finite distance | Light wave is from a source at infinity |
| 3. | For laboratory conditions, convex lenses need not be used | In laboratory conditions, convex lenses are to be used |
| 4. | Difficult to observe and analyse. | Easy to observe and analyse. |
| 5. |  |  |

20. (i) The electric field near the edge is very high and it ionizes the surrounding air.

(ii) The positive ions are repelled at the sharp edge and negative ions are attracted towards the sharper edge.

(iii) This reduces the total charge of the conductor near the sharp edge. This is called action of points or corona discharge.

21. The zone (in between A and B) where there is no reception of electromagnetic waves neither ground nor sky is known as skip zone or skip area.

22. The neutrino has the following properties

(i) It has zero charge

(ii) It has an antiparticle called anti-neutrino.

(iii) Recent experiments showed that the neutrino has very tiny mass.

(iv) It interacts very weakly with the matter. Therefore, it is very difficult to detect. In fact, in every second, trillions of neutrinos coming from the sun are passing through our body without any interaction.

23. The susceptibility of material X is

$$\chi_{m,X} = \frac{\left|\vec{M}\right|}{\left|\vec{H}\right|} = \frac{500}{1000} = 0.5$$

$$\chi_{m,Y} = \frac{\left|\vec{M}\right|}{\left|\vec{H}\right|} = \frac{2000}{1000} = 2$$

Since, susceptibility of material Y is greater than that of material X, which implies that material Y can be easily magnetized.

The ratio between the susceptibilities of the two materials = 0.5 : 2

24. (i) De-Broglie wavelength of an electron is very less comparable to x-rays.
    (ii) We can build a high resolving power microscope using electrons.
    (iii) Resolving power of a microscope is inversely proportional to the wave length. $r_0 \propto \dfrac{1}{\lambda}$.

## PART - III

25. **Galvanometer to a voltmeter :**

A voltmeter is an instrument used to measure potential difference across any two points in the electrical circuits.

Voltmeter must have high resistance and when it is connected in parallel, it will not draw appreciable current so that it will indicate the true potential difference.
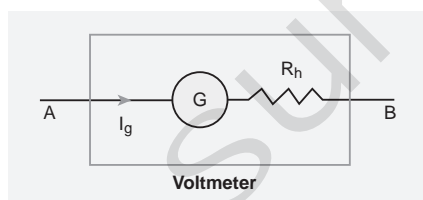


**High resistance connected in series**

A galvanometer is converted into a voltmeter by connecting high resistance $R_h$ in series with galvanometer as shown in Figure.

Let $R_g$ be the resistance of galvanometer and $I_g$ be the current with which the galvanometer produces full scale deflection. Since it is a connection.

$$I = I_g$$

$$I = I_g \Rightarrow I_g = \frac{\text{potential difference}}{\text{total resistance}}$$

Since the galvanometer and high resistance are connected in series, the total resistance or effective resistance gives the resistance of voltmeter. The voltmeter resistance is

$$R_v = R_g + R_h$$

Therefore,   $I_g = \dfrac{V}{R_g + R_h}$    $\Rightarrow R_g = \dfrac{V}{I_g} - R_g$

Note that $I_g \propto V$ An ideal voltmeter is one which has infinite resistance.

26. **Given :** Resistance of a nichrome wire at 0°C

$R_0$ = 10 Ω

Temperature coefficient of resistance $\alpha$ = 0.004/°C

**To find :** Resistance at boiling point of water $R_T$ = ?

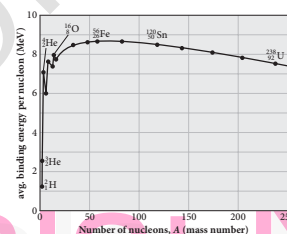$R_T = R_0[1 + \alpha (T - T_0)]$ where T is temperature of boiling point of water

   T  = 100 °C ; $T_0$ = 0 °C

$R_T$ = 10 [1 + 0.004 × (100–0)] = 10 (1 + 0.4)

$R_T$ = 14 Ω

As the temperature increases, the resistance of the wire also increases.

27. Important inferences from the average binding energy curve:



**Avg. binding energy of the nucleons**

(i) The value of $\overline{BE}$ rises as the mass number increases until it reaches a maximum value of 8.8 MeV for A = 56 (iron) and then it slowly decreases.

(ii) The average binding energy per nucleon is about 8.5 MeV for nuclei having mass number lying between A = 40 and 120. These elements are comparatively more stable and not radioactive.

(iii) For higher mass numbers, the curve drops slowly and $\overline{BE}$ for uranium is about 7.6 MeV. They are unstable and exhibit radioactive.

If two light nuclei with A<28 combine with a nucleus with A<56, the binding energy per nucleon is more for final nucleus than initial nuclei. Thus, if the lighter elements combine to produce a nucleus of medium value A, a large amount of energy will be released. This is the basis of nuclear fusion and is the principle of the hydrogen bomb.

(iv) If a nucleus of heavy element is split (fission) into two or more nuclei of medium value A, the energy released would again be large. The atom bomb is based on this principle and huge energy of atom bombs comes from this fission when it is uncontrolled.

# 12ᵗʰ STD.    PUBLIC EXAM MODEL QUESTION PAPER ③

## PHYSICS

Register Number

TIME : 3.00 Hours

**(with Answers)**

MAXIMUM MARKS : 70

**Instructions :**

(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use Blue or Black ink to write and underline and pencil to draw diagrams.

### PART - I

*Note :* (i) Answer all the questions:        $(15 \times 1 = 15)$

(ii) Choose the most appropriate answer from the given four alternatives and write the option code with the corresponding answer.

1. Which one of the following is the natural nanomaterial?

   (a) Grain of sand        (b) Peacock feather

   (c) Skin of the whale    (d) Peacock beak

2. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 kV, then the de-Broglie wavelength associated with the electrons would:

   (a) decrease by 4 times

   (b) increase by 2 times

   (c) increase by 4 times

   (d) decrease by 2 times

3. The variation of frequency of carrier wave with respect to the instantaneous amplitude of the modulating signal is called:

   (a) Phase modulation

   (b) Amplitude modulation

   (c) Pulse width modulation

   (d) Frequency modulation

4. Q factor is equal to _____.

   (a) $\dfrac{\omega_r L}{R}$        (b) $\dfrac{1}{R}\sqrt{\dfrac{L}{C}}$

   (c) $\dfrac{X_L}{R}$             (d) All the above

5. Two metallic spheres of radii 1 cm and 3 cm are given charges of $-1\times10^{-2}$ C and $5\times10^{-2}$ C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is:

   (a) $1 \times 10^{-2}$ C        (b) $3 \times 10^{-2}$ C

   (c) $2 \times 10^{-2}$ C        (d) $4 \times 10^{-2}$ C

6. Which of the following is an electromagnetic wave?

   (a) $\beta$ - rays        (b) $\gamma$- rays

   (c) $\alpha$- rays        (d) All of the above

7. An air bubble in glass slab of refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness of the slab is:

   (a) 12 cm        (b) 8 cm

   (c) 16 cm        (d) 10 cm

8. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, the resistance of a 60W bulb for use in USA will be :

   (a) R / 4        (b) R

   (c) R / 2        (d) 2 R

9. A wire of length $l$ carrying a current I along the Y direction is kept in a magnetic field given by $\vec{B} = \dfrac{\beta}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)\text{T}$. The magnitude of Lorentz force acting on the wire is :

   (a) $\sqrt{2}\beta I l$        (b) $\sqrt{\dfrac{2}{3}}\beta I l$

   (c) $\sqrt{\dfrac{1}{2}}\beta I l$        (d) $\sqrt{\dfrac{1}{3}}\beta I l$

10. Emission of electrons by the absorption of heat energy is called ____ emission.

    (a) Thermionic        (b) Photoelectric

    (c) Secondary         (d) Field

11. If a current of 7.5 A is maintained in a wire for 45 seconds then the charge flowing through the wire is:

    (a) 6 C        (b) 365.5 C

    (c) 3 C        (d) 337.5 C

12. The charge of cathode ray is :
    (a) neutral          (b) positive
    (c) not defined      (d) negative

13. A step-down transformer reduces the supply voltage from 220 V to 11 V and increases the current from 6 A to 100 A. Then its efficiency is:
    (a) 0.12          (b) 1.2
    (c) 0.9           (d) 0.83

14. The electric potential of an electron is given by $V = V_0 \ln\left(\dfrac{r}{r_0}\right)$, where $r_0$ is a constant. If Bohr atom model is valid, then variation of radius of $n^{th}$ orbit $r_n$ with the principal quantum number $n$ is :

    (a) $r_n \propto \dfrac{1}{n^2}$       (b) $r_n \propto \dfrac{1}{n}$

    (c) $r_n \propto n^2$          (d) $r_n \propto n$

15. Transverse nature of light is shown in :
    (a) scattering       (b) interference
    (c) polarisation     (d) diffraction

## PART - II

**Note:** Answer **any six** questions. Question number **24 is compulsory.**          **(6 × 2 = 12)**

16. What is corona discharge?

17. How will you increase the current sensitivity of a galvanometer?

18. Define work function of a metal. Mention its unit.

19. Calculate the radius of $^{197}_{79}$Au nucleus.

20. State Fleming's right hand rule.

21. What do you mean by Doping?

22. What is displacement current?

23. Define electrical resistivity.

24. The angle of minimum deviation for the equilateral prism is 40°. Find the refractive index of the material of the prism.

## PART - III

Note: Answer **any six** questions. Question number **33** is **compulsory.**          **(6 × 3 = 18)**

25. Derive the relation between $f$ and R for a spherical mirror.

26. Obtain a relation between current and drift velocity.

27. List out the laws of photo electric effect.

28. Draw the circuit diagram of NPN transistor in Common Emitter Configuration.

29. Give the uses of Polaroids.

30. Derive the expression for resultant capacitance, when capacitors are connected in series.

31. Find the :
    (i) Angular momentum
    (ii) Velocity of the electron revolving in the 5th orbit of hydrogen atom. (h = $6.6 \times 10^{-34}$ Js; m = $9.1 \times 10^{-31}$ kg)

32. List out salient features of magnetic Lorentz force.

33. Find the impedance of a series RLC circuit, if the inductive reactance, capacitive reactance and resistance are 184 Ω, 144 Ω and 30 Ω respectively. Also calculate the phase angle between voltage and current.

## PART - IV

**Note:** Answer **all** the questions          **(5 × 5 = 25)**

34. (a) Explain the construction and working of full wave rectifier.
            OR
    (b) Explain the construction and working of transformer.

35. (a) Derive an expression for electrostatic potential due to an electric dipole.
            OR
    (b) Obtain the equation for bandwidth in Young's Double Slit Experiment.

36. (a) Using Biot-Savart Law deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.
            OR
    (b) Discuss the spectral series of hydrogen atom.

37. (a) (i) How do we obtain characteristic X-ray spectra?
        (ii) Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-ray tube of accelerating potential 20,000 V.
            OR
    (b) What is spectrum? Explain the types of emission spectrum.

38. (a) Obtain Lens maker's formula.
            OR
    (b) Explain the determination of the internal resistance of cell using voltmeter.

# ANSWERS

## Pᴀʀᴛ - I

1. (b) Peacock feather

2. (a) decrease by 4 times

3. (d) Frequency modulation

4. (d) All the above

5. (b) $3 \times 10^{-2}$ C

6. (b) $\gamma$- rays

7. (a) 12 cm

8. (a) R / 4

9. (b) $\sqrt{\dfrac{2}{3}}\beta I l$

10. (a) Thermionic

11. (d) 337.5 C

12. (d) negative

13. (d) 0.83

14. (d) $r_n \propto n$

15. (c) polarisation

## Pᴀʀᴛ - II

16. (i) The electric field near the edge is very high and it ionizes the surrounding air.

    (ii) The positive ions are repelled at the sharp edge and negative ions are attracted towards the sharper edge.

    (iii) This reduces the total charge of the conductor near the sharp edge. This is called action of points or corona discharge.

17. The current sensitivity of a galvanometer can be increased by

    (i) increasing the number of turns, N

    (ii) increasing the magnetic induction, B

    (iii) increasing the area of the coil, A

    (iv) decreasing the couple per unit twist of the suspension wire, K.

18. (i) The minimum energy needed for an electron to escape from the metal surface is called work function of that metal.

    (ii) It is denoted by $\phi_0$ and is measured in electron volt (eV).

19. **Solution :**

    Radius of the nucleus $R = R_0 A^{\frac{1}{3}}$

    $R = 1.2 \times 10^{-15} \times (197)^{\frac{1}{3}} = 6.97 \times 10^{-15}$ m

$R = 1.2 \times 5.819 \times 10^{-15}$

$R = 6.98 \times 10^{-15}$ m.

20. Fleming's right hand rule states that if the index finger points the direction of the magnetic field and the thumb indicates the direction of motion of the conductor, then the middle finger will indicate the direction of the induced current.

21. (i) The Process of adding impurities to the intrinsic semiconductor is called doping.

    (ii) The impurity atoms are called dopants in 100 ppm

22. The displacement current can be defined as the current which comes into play in the region in which the electric field in changing with time.

23. Electrical resistivity of a material is defined as the resistance offered to current flow by a conductor of unit length having unit area of cross section.

    $\rho = \dfrac{RA}{L}$. Unit : ohm-metre ($\Omega$ m)

24. **Solution:**

    Given, A = 60° ; D = 40°

    $n = \dfrac{\sin\left(\dfrac{A + D}{2}\right)}{\sin\left(\dfrac{A}{2}\right)}$

    Substituting the values,
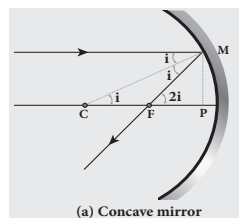
    $n = \dfrac{\sin\left(\dfrac{60° + 40°}{2}\right)}{\sin\left(\dfrac{60°}{2}\right)} = \dfrac{\sin(50°)}{\sin(30°)}$
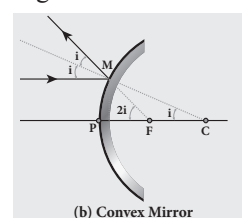
    $= \dfrac{0.766}{0.50} = 1.532$

    $\mu = 1.53$

## Pᴀʀᴛ - III

25. (i) C - centre of curvature of the mirror.

    F - principal focus

    (ii) A parallel ray of light is incident at M and after reflection passes through F angle an incidence *i* will be same to the angle of reflection.



(a) Concave mirror          (b) Convex Mirror

# CHEMISTRY

## PUBLIC EXAM MODEL QUESTION PAPER ①

**12**th STD.

PART - III

## CHEMISTRY

(with Answers)

TIME ALLOWED : **3.00 Hours**]

Register Number

[MAXIMUM MARKS : **70**]

**Instructions :**

1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor Immediately.

2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams

## PART - I

**Note :** (i) Answer all the questions. **[15 × 1 = 15]**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

**1.** Match the following :

| (1) | Fluorine | (i) | Identification of coloured metal ions |
|---|---|---|---|
| (2) | Borax | (ii) | Strong oxidising agent |
| (3) | Aluminium | (iii) | Chalgogens Present in volcanic ashes |
| (4) | Sulphur | (iv) | Most abundant element |

(a) (1)-(iii), (2)-(ii), (3)-(iv), (4)-(i)
(b) (1)-(ii), (2)-(i), (3)-(iv), (4)-(iii)
(c) (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i)
(d) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii)

**2.** Wolframite ore is separated from tinstone by the process of :
(a) Electromagnetic separation
(b) Smelting
(c) Calcination
(d) Roasting

**3.** The transition element which has only +3 oxidation state is :
(a) Ni　　(b) Mn　　(c) Cr　　(d) Sc

**4.** The medicinal value of a drug is measured in terms of its :
(a) Deoxyribose　　(b) Gold number
(c) Therapeutic index
(d) Equilibrium constant

**5.** The aqueous solutions of sodium formate, anilinium chloride and potassium cyanide are respectively :

(a) acidic, acidic, acidic
(b) acidic, acidic, basic
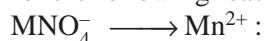(c) basic, acidic, basic
(d) basic, neutral, basic

**6.** If one strand of the DNA has the sequence 'ATGCTTGA', then the sequence of complementary strand would be :
(a) TACGRAGT　　(b) TACGAACT
(c) TCCGAACT　　(d) TACGTACT

**7.** Which one of the following is most basic?
(a) 2, 4-dibromo aniline
(b) 2, 4-dichloro aniline
(c) 2, 4-dimethyl aniline
(d) 2, 4-dinitro aniline

**8.** How many Faradays of electricity are required for the following reaction to occur
$MNO_4^- \longrightarrow Mn^{2+}$ :
(a) 7F　　(b) 5F　　(c) 3F　　(d) 1F

**9.** Assertion : p – N, N – dimethyl aminobenzaldehyde undergoes benzoin condensation

Reason : The aldehydic (-CHO) group is meta directing

(a) Both Assertion and Reason are false.

(b) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(c) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(d) Assertion is true but Reason is false.

**10.** Laptops have :
(a) Lead storage battery
(b) Fuel cell
(c) Mercury button cell
(d) Lithium-ion battery

**11.** Formula for hyponitrous acid :

    (a) HOONO         (b) $H_2N_2O_2$

    (c) $HNO_2$          (d) $HNO_4$

**12.** Williamson synthesis of preparing dimethyl ether is a / an :

    (a) Electrophilic substitution reaction

    (b) $SN^1$ reaction

    (c) $SN^2$ reaction

    (d) Electrophilic addition reaction

**13.** The vacant space in bcc lattice unit cell is :

    (a) 26%         (b) 48%

    (c) 23%         (d) 32%

**14.** Time required for the reactant concentration to reach one half of its initial value is called :

    (a) half life period    (b) first order

    (c) zero order       (d) second order

**15.** The major product obtained when phenol reacts with Con. $H_2SO_4$ at 280 K is :

    (a) Salicylic acid

    (b) Picric acid

    (c) o-phenol sulphonic acid

    (d) p-phenol sulphonic acid

### PART - II

**Note : Answer any six questions. Question No. 24 is compulsory.**    $6 \times 2 = 12$

**16.** How is bleaching powder prepared?

**17.** Classify the following elements into d-block and f-block elements :

    (i) Tungsten     (ii) Ruthenium

    (iii) Promethium   (ii) Einsteinium

**18.** Write any two hydrate isomers of the complex with the molecular formula $CrCl_3.6H_2O$.

**19.** If the no. of close packed sphere is 6, calculate the number of Octahedral voids and Tetrahedral voids generated.

**20.** What are Lewis acids and bases? Give two example for each.

**21.** Write the dispersed phase and dispersion medium of butter.

**22.** Name the catalyst used in Rosenmund reduction and state its importance.

**23.** How is chloropicrin prepared?

**24.** Why is C–O–C bond angle in ether slightly greater than the tetrahedral bond angle?

### PART - III

**Note : Answer any six questions. Question No. 33 is Compulsory.**    $6 \times 3 = 18$

**25.** Write the Chromyl chloride Test.

**26.** $[Sc(H_2O)_6]^{3+}$ is colourless - Explain.

**27.** Derive Henderson equation.

**28.** Define order and molecularity of a reaction.

**29.** Mention the shapes of the following colloidal particles.

    (i)    $As_2S_3$

    (ii)   Blue gold sol

    (iii)  Tungstic acid sol

**30.** Formic acid reduces Tollens reagent whereas acetic acid does not reduce. Give reason.

**31.** How are proteins classified bases on their structure? Explain.

**32.** State any three advantages of food additives.

**33.** There is only a marginal difference in decrease in ionisation enthalpy from Aluminium to Thallium - Explain why?

### PART - IV

**Note : Answer all the questions:**.    $5 \times 5 = 25$

**34.** (a) Explain zone refining process.

    **(OR)**

    (b) (i) Write any two conditions for catenation.

        (ii) Why HF cannot be stored in glass bottles?

**35.** (a) (i) Write the molecular formula and draw the structure of sulphurous acid and Marshall's acid.

        (ii) Write the IUPAC name of the following :

        (A) $[Ag(NH_3)_2]^+$

        (B) $[Co(NH_3)_5Cl]^{2+}$

    **(OR)**

(b) (i) Calculate the magnetic moment and magnetic property of $[CoF_6]^{3-}$

(ii) Write a note on Frenkel defect.

**36.** (a) Derive integrated rate law for a zero order reaction A $\longrightarrow$ product.

**(OR)**

(b) (i) Write the pH value of the following substances :

(A) Vinegar    (B) Black coffee

(C) Baking soda (D) Soapy water

(ii) A conductivity cell has two platinum electrodes separated by a distance of 1.5 cm and the cross sectional area of each electrode is 4.5 sq.cm. Using this cell, the resistance of 0.5 N electrolytic solution was measured as 15 ohms. Find the specific conductance of the solution.

**37.** (a) (i) Give any three differences between chemisorption and physisorption.

(ii) What is packing efficiency?

**(OR)**

(b) (i) Give the coupling reactions of phenol.

(ii) How will you prepare the following by using Grignard reagent?

(A) propan-1-ol    (B) propan-2-ol

**38.** (a) (i) What is Formalin? What is its use?

(ii) What is glycosidic linkage?

**(OR)**

(b) (i) What is Gomberg reaction? Explain.

(ii) Identify A and B.

$$A \xrightarrow[4[H]]{Na(Hg)/C_2H_5OH} CH_3 - CH_2 - NH_2$$

$$B \xrightarrow[4[H]]{Na(Hg)/C_2H_5OH} CH_3 - NH - CH_3$$

★ ★ ★

## ANSWER

### PART - I

1. (b) (1)-(ii), (2)-(i), (3)-(iv), (4)-(iii)
2. (a) Electromagnetic separation
3. (d) Sc
4. (c) Therapeutic index
5. (c) basic, acidic, basic
6. (b) TACGAACT
7. (c) 2, 4-dimethyl aniline
8. (b) 5F
9. (c) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
10. (d) Lithium-ion battery
11. (b) $H_2N_2O_2$
12. (c) $SN^2$ reaction
13. (d) 32%
14. (a) half life period
15. (c) o-phenol sulphonic acid

### PART - II

16. Bleaching powder is produced by passing chlorine gas through dry slaked lime (calcium hydroxide).

$$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$$

17. (i) Tungsten – d block

(ii) Ruthenium – d block

(iii) Promethium – f block

(iv) Einsteinium – f block

18. The complex with molecular formula $CrCl_3.6H_2O$ has three hydrate isomers as shown below.

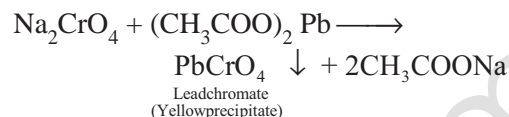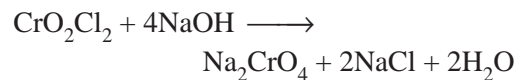| $[Cr(H_2O)_6]Cl_3$ | a violet colour compound and gives three chloride ions in solution, |
|---|---|
| $[Cr(H_2O)_5Cl]Cl_2 .H_2O$ | a pale green colour compound and gives two chloride ions in solution and, |
| $[Cr(H_2O)_4Cl_2]Cl.2 H_2O$ | dark green colour compound and gives one chloride ion in solution |

**19.** If the number of close packed sphere is 6

Octahedral voids is 6

Tetrahedral voids is 12

**20.** **Lewis acid** - A Lewis acid is a positive ion (or) an electron deficient molecule which accepts an electron pair.

**Eg :** $BF_3$, $AlCl_3$, $BeF_2$.

**Lewis Base -** A Lewis base is a anion (or) neutral molecule with at least one lone pair of electrons.

**Eg :** $NH_3$, $R-NH_2$, $F^-$, $Cl^-$.

**21.** In Butter

**dispersed phase** – liquid

**dispersion medium** – solid

**22.**

$$CH_3 - \underset{\underset{O}{\|}}{C} - Cl + H - H \xrightarrow[BaSO_4]{Pd} CH_3 - \underset{\underset{O}{\|}}{C} - H + HCl$$

Acetyl chloride                    Acetaldehyde

BIn the above reaction, barium sulphate act as a catalytic poison to palladium Catalyst, so that aldehyde cannot be further reduced to alcohol.

**23.** Chloropicrin preparation:

$$\underset{nitromethane}{CH_3NO_2} \xrightarrow[NaOH]{Cl_2} \underset{Chloropicrin}{CCl_3NO_2} + 3HCl$$

**24.** The C-O-C bond angle is slightly greater than the tetrahedral bond angle due to the repulsive interaction between the two bulkier alkyl groups.

## PART - III

**25. (i)** When potassium dichromate is heated with any chloride salt in the presence of Conc. $H_2SO_4$, orange red vapours of chromyl chloride ($CrO_2Cl_2$) is evolved.

**(ii)** This reaction is used to confirm the presence of chloride ion in inorganic qualitative analysis.

$$K_2Cr_2O_7 + 4NaCl + 6H_2SO_4 \longrightarrow$$

$$2KHSO_4 + 4NaHSO_4 + 2\underset{Chromyl\ chloride}{CrO_2Cl_2}\uparrow + 3H_2O$$

**(iii)** The chromyl chloride vapours are dissolved in sodium hydroxide solution and then acidified with acetic acid and treated with lead acetate. A yellow precipitate of lead chromate is obtained.

$$CrO_2Cl_2 + 4NaOH \longrightarrow$$
$$Na_2CrO_4 + 2NaCl + 2H_2O$$

$$Na_2CrO_4 + (CH_3COO)_2\,Pb \longrightarrow$$
$$\underset{\substack{Leadchromate\\(Yellowprecipitate)}}{PbCrO_4}\downarrow + 2CH_3COONa$$

**26.** Sc : $3d^1\,4s^2$ :

Sc$^{3+}$ : $3d^0$

$[Sc(H_2O)_6]^{3+}$ has no unpaired electron so it is colourless.

**27.** The concentration of hydronium ion in an acidic buffer solution depends on the ratio of the concentration of the weak acid to the concentration of its conjugate base present in the solution i.e.,

$$\left[H_3O^+\right] = K_a \frac{[acid]_{eq}}{[base]_{eq}}$$

For a basic buffer $pOH = pK_b + \log \dfrac{[salt]}{[base]}$.

**28.** **Order of a reaction :**

(i) It is the sum of the powers of concentration terms involved in the experimentally determined rate law.

(ii) It can be zero (or) fractional (or) integer.

(iii) It is assigned for a overall reaction.

**Molecularity of a reaction :**

(i) It is the total number of reactant species that are involved in an elementary step.

(ii) It is always a whole number, cannot be zero or a fractional number.

(iii) It is assigned for each elementary step of mechanism.

**29.** Shapes of the colloidal particles:

$As_2S_3$ – Spherical

Blue gold sol – Disc (or) Plate like

Tungstic acid sol – Rod like

**30. (i)** Formic acid (HCOOH) is unique because it contains both an aldehyde group and carboxyl group also.

**(ii)** Hence it can act as a **reducing agent**. It reduces Fehling's solution Tollen's reagent and decolourises pink coloured $KMnO_4$ solution.

**(iii)** Formic acid reduces ammoniacal silver nitrate solution **(Tollen's reagent)** to metallic silver.

$$HCOOH + Ag_2O \longrightarrow H_2O + CO_2 + 2Ag\downarrow \text{(metallic silver)}$$

# 12ᵗʰ STD.

## SURA'S MODEL QUESTION PAPER ④

### PART - III
### CHEMISTRY
### (with Answers)

Register Number

TIME ALLOWED : 3.00 Hours]                 [MAXIMUM MARKS : 70

**Instructions :**

(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

**Note :** Draw diagrams and write equations wherever necessary.

## PART - I

*Note :* (i)  Answer **all** the questions:  $(15 \times 1 = 15)$

(ii)  Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.

**1.** Which one of the following ore is best concentrated by froath - floatation method?
   a) Magnetite
   b) Haematite
   c) Galena
   d) Cassiterite

**2.** Which compound is used as flux in metallurgy?
   a) Boric acid
   b) Borax
   c) Diborane
   d) $BF_3$

**3.** The shape of $XeOF_4$ is
   a) T Shaped
   b) Pyramidal
   c) Square planar
   d) Square pyramidal

**4.** How many moles of acidified $KMnO_4$ required to oxidise one mole of oxalic acid?
   a) 5
   b) 1.5
   c) 0.6
   d) 0.4

**5.** The type of isomerism exhibited by $[Pt(NH_3)_2Cl_2]$ ?
   a) coordination isomerism
   b) linkage isomerism
   c) optical isomerism
   d) geometrical isomerism

**6.** The fraction of the total volume occupied by the atoms in a fcc is
   a) $\dfrac{\pi}{6}$
   b) $\dfrac{\pi}{3\sqrt{2}}$
   c) $\dfrac{\pi}{4}$
   d) $\dfrac{\sqrt{3}\pi}{8}$

**7.** The half life period of a radioactive element is 140 days. After 280 days 1g of element will be reduced to which amount of the following?
   a) $\dfrac{1}{4}$
   b) $\dfrac{1}{16}$
   c) $\dfrac{1}{8}$
   d) $\dfrac{1}{2}$

**8.** Which is not a Lewis base?
   a) $BF_3$
   b) $PF_3$
   c) CO
   d) $F^-$

**9.** During electrolysis of molten copper chloride, the time required to produce 0.2 mole of chlorine gas using a current of 2A is
   a) 32.66 min
   b) 321.66 min
   c) 378 min
   d) 260 min

**10.** Smoke is a colloidal solution of
   a) Solid in gas
   b) Gas in gas
   c) liquid in gas
   d) Gas in liquid

**11.** Iso propyl benzene on oxidation in presence of air and dilute acid gives
   a) $C_6H_5COOH$
   b) $C_6H_5COCH_3$
   c) $C_6H_5COC_6H_5$
   d) $C_6H_5OH$

**12.** But - 2 ene on ozonolyis followed by subsequent cleavage with Zn and water gives
   a) ethanal
   b) Propanal
   c) Propanone
   d) Methanal

**13.** Aniline + benzoyl chloride $\xrightarrow{\text{NaOH}}$ $C_6H_5NH-OC-C_6H_5$. This reaction is known as
   a) Friedal - craft's reaction
   b) HVZ reaction
   c) Schotten - Baumann reaction
   d) Cannizaro reaction

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**14.** The pyrimidine bases present in DNA are
   a) Cytosine and Adenine
   b) Cytosine and Guanine
   c) Cytosine and Thiamine
   d) Cytosine and Uracil

**15.** Nylon is an example of
   a) Polyamide          b) Polythene
   c) Polyester          d) Polysaccharide

# PART - II

Answer any **six** questions. Question No. 24 is compulsory                    **(6 × 2 = 12)**

**16.** How will you identify borate radical?

**17.** How is pure phosphine prepared from phosphorous acid?

**18.** What are ionisation isomers? Explain with an example

**19.** What is pseudo first order reaction? Give one example

**20.** State Faraday's second law of electrolysis

**21.** How will you convert
   (i) White phosphorus to red phosphorus
   (ii) Red phosphorus to white posphorus

**22.** Give any four differences between DNA and RNA

**23.** Write short notes on Antioxidants

**24.** 50ml of 0.05M $HNO_3$ is added to 50ml of 0.025M KOH. Calculate the pH of the resultant solution.

# PART - III

Answer any **six** questions. Question No. 33 is compulsory                    **(6 × 3 = 18)**

**25.** Explain the electro metallurgy of aluminium.

**26.** Give the uses of helium.

**27.** Explain chromyl chloride Test

**28.** A face centred cubic solid of an element (atomic mass 60 $gmol^{-1}$) has a cube edge of 4A°. Calculate its density.

**29.** Describe the construction of Daniel cell and write its cell reaction.

**30.** Write short notes on
   *(i)* Negative catalyst
   *(ii)* Phase transfer catalyst

**31.** Explain the mechanism of Aldol condensation of acetaldehyde.

**32.** Explain the preparation of Nylon - 6,6 and Buna - S.

**33.** Identify A to C in the following sequence?

$$C_6H_5NO_2 \xrightarrow[HCl]{Fel} A \xrightarrow[273K]{HNO_2} B \xrightarrow[\Lambda]{H_2O} C$$
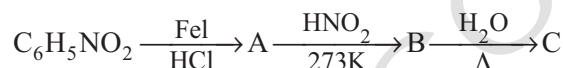
# PART - IV

Answer **all** the following questions.

                    **(5 × 5 = 25)**

**34.** **(a)** (i) Explain how gold ore is leached by cyanide process
   (ii) Explain the classification of Inosilicates
   **(or)**
   **(b)** (i) What are interhalogen compounds? Give examples.
   (ii) Explain the preparation of $KMnO_4$.

**35.** **(a)** (i) Explain $[Fe(CN)_6]^{3-}$ is paramagnetic, using Crystal Field theory
   (ii) What is schottky detect?
   **(or)**
   **(b)** (i) Derive Henderson - Hasselbalch equation
   (ii) What is kohlraush's law?

**36.** **(a)** (i) Explain Intermediate compound formation theory
   (ii) Write short notes on ultra filtration.
   **(or)**
   **(b)** How the following conversions are effected?
   (i) Phenol → Salicylaldehyde
   (ii) Phenol → Phenolphthalein
   (iii) glycol → 1,4 dioxane

**37.** **(a)** Write short notes on
   (i) Mustard oil reactions
   (ii) Carbylamine reaction
   (iii) Gabriel pathalimide syntheis

**(or)**

**(b)** Explain the structure of Fructose.

**38. (a) (i)** A first order reaction is 40% complete in 50 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete?

**(ii)** $K_{sp}$ of $Ag_2CrO_4$ is $1.1 \times 10^{-12}$. What is the solubility of $Ag_2CrO_4$ in 0.1 M $K_2CrO_4$?

**(or)**

**(b)** Compound A of molecular formula $C_7H_6O$ reduces Tollen's reagent when A reacts with 50% NaOH gives compound B of molecular formula $C_7H_8O$ and C of molecular formula $C_7H_5O_2$ Na. Compound C on treatment with dil HCl gives compound D of molecular formula $C_7H_6O_2$. When D is heated with sodalime gives compound E. Identify A, B, C, D & E. Write the corresponding equations.

★ ★ ★

### ANSWER

### PART - I

1. c) Galena
2. b) Borax
3. d) Square pyramidal
4. c) 0.6
5. a) coordination isomerism
6. a) $\dfrac{\pi}{6}$
7. b) $\dfrac{1}{16}$
8. a) $BF_3$
9. b) 321 .66 min
10. a) Solid in gas
11. d) $C_6H_5OH$
12. a) ethanal
13. c) Schotten - Baumann reaction
14. c) Cytosine and Thiamine
15. a) Polyamide

### PART - II

**16. Borate Radical :**

**(i)** When boric acid or borate salt is heated with ethyl alcohol in presence of conc. sulphuric acid, an ester, triethylborate is formed.

**(ii)** The vapour of this ester burns with a green edged flame and this reaction is used to identify the presence of borate.

$$H_3BO_3 + 3C_2H_5OH \xrightarrow[H_2SO_4]{Conc.} B(OC_2H_5)_3 + 3H_2O$$
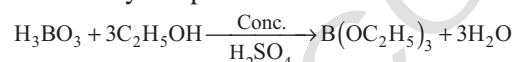
**17.** Phosphine is prepared in pure form by heating phosphorous acid.

$$\underset{\text{Phosphorous acid}}{4H_3PO_3} \xrightarrow{\Delta} \underset{\text{Ortho phosphoric acid}}{3H_3PO_4} + \underset{\text{Phosphine}}{PH_3} \uparrow$$

**18.** Ionisation isomers arises when an ionisable counter ion (simple ion) itself can act as a ligand. The exchange of such counter ions with one or more ligands in the coordination entity will result in ionisation isomers.

Some more example for the isomers,

1. $[Cr(NH_3)_4ClBr]NO_2$ and $[Cr(NH_3)_4Cl\,NO_2]Br$
2. $[Co(NH_3)_4Br_2]Cl$ and $[Co(NH_3)_4Cl\,Br]Br$

**19. Pseudo first order reaction :**

**(i)** A second order reaction can be altered to a first order reaction by taking one of the reactant in large excess, such reaction is called pseudo first order reaction. Let us consider the acid hydrolysis of an ester

$$CH_3COOCH_{3(aq)} + H_2O_{(l)} \xrightarrow{H^+}$$

$$CH_3COOH_{(aq)} + CH_3OH_{(aq)}$$
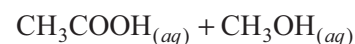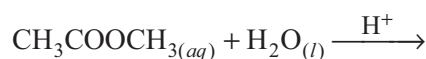
Rate $= k\,[CH_3COOCH_3]\,[H_2O]$

**(ii)** If the reaction is carried out with the large excess of water, there is no significant change in the concentration of water during hydrolysis. i.e.,concentration of water remains almost a constant.

**(iii)** Now, we can define $k\,[H_2O] = k'$; Therefore the above rate equation becomes

Rate $= k'\,[CH_3COOCH_3]$

**(iv)** Thus it follows first order kinetics.

**20. Second Law :** When the same quantity of charge is passed through the solutions of different electrolytes, the amount of substances liberated at the respective electrodes are directly proportional to their electrochemical equivalents.

**21.** (i) The white phosphorus can be changed into red phosphorus by heating it to 420°C.

(ii) The red phosphorus can be converted back into white phosphorus by boiling it in an inert atmosph hen glycerol reacts with $KHSO_4$, dehydration takes place and the product formed will be acrolein.

**22.**

| DNA | RNA |
|---|---|
| It is mainly present in nucleus, mitochondria and chloroplast | It is mainly present in cytoplasm, nucleolus and ribosomes |
| It contains deoxyribose sugar | It contains ribose sugar |
| Base pair A = T. G ≡ C | Base pair A = U. C ≡ G |
| Double stranded molecules | Single stranded molecules |
| It's life time is high | It is short lived |
| It is stable and not hydrolysed easily by alkalis | It is unstable and hydrolyzed easily by alkalis |
| It can replicate itself | It cannot replicate itself. It is formed from DNA. |

**23.** *(i)* Antioxidants are substances which retard the oxidative deteriorations of food.

*(ii)* Food containing fats and oils is easily oxidised and turn rancid.

*(iii)* To prevent the oxidation of the fats and oils, chemical BHT(butylhydroxy toluene), BHA(Butylated hydroxy anisole) are added as food additives.

*(iv)* They are generally called antioxidants. These materials readily undergo oxidation by reacting with free radicals generated by the oxidation of oils, thereby stop the chain reaction of oxidation of food.

**24.** Number of moles of $HNO_3$ = $0.05 \times 50 \times 10^{-3}$
$$= 2.5 \times 10^{-3}$$

Number of moles of KOH = $0.025 \times 50 \times 10^{-3}$
$$= 1.25 \times 10^{-3}$$

Number of moles of $HNO_3$ after mixing
$$= \quad 2.5 \times 10^{-3} - 1.5 \times 10^{-3}$$
$$= \quad 1.25 \times 10^{-3}$$

∴ concentration of $HNO_3$
$$= \frac{\text{Number of moles of } HNO_3}{\text{Volume is litre}}$$

After mixing, total volume = 100 ml
$$= 100 \times 10^{-3} L$$

$$\therefore [H^+] = \frac{1.25 \times 10^{-3} \text{ moles}}{100 \times 10^{-3} L}$$

$$= 1.25 \times 10^{-2} \text{ moles } L^{-1}$$

$$pH = -\log [H^+]$$
$$pH = -\log (1.25 \times 10^{-2}) = 2 - 0.0969$$
$$= 1.9031.$$

## PART - III
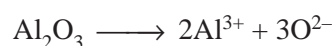
**25. Hell - Herold Process :**

Cathode : Iron tank lined with carbon

Anode : Carbon blocks

Electrolytes : 20% solution of alumina obtained from bauxite + Molten cryolite + Calcium chloride (lowers the melting point of the mixture)
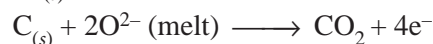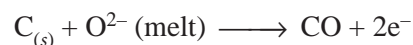
Temperature : Above 1270 K

Ionisaiton of alumina
$$Al_2O_3 \longrightarrow 2Al^{3+} + 3O^{2-}$$

Reaction at cathode
$$2Al^{3+} (melt) + 6e^- \longrightarrow 2Al_{(l)}$$

Reaction at anode
$$6O^{2-} (melt) \longrightarrow 3O_2 + 12e^-$$

**(ii)** Since carbon acts as anode the following reaction takes place.
$$C_{(s)} + O^{2-} (melt) \longrightarrow CO + 2e^-$$
$$C_{(s)} + 2O^{2-} (melt) \longrightarrow CO_2 + 4e^-$$

**(iii)** During electrolysis anodes are slowly consumed due to the above two reactions.

**(iv)** Aluminium is formed at the cathode and settles at the bottom.

**(v)** Net electrolysis reaction is
$$4Al^{3+} (melt) + 6O^{2-} (melt) + 3C_{(s)} \longrightarrow$$
$$4Al_{(l)} + 3CO_{2(g)}$$

# Biology

| | **PUBLIC EXAM MODEL QUESTION PAPER** | **1** |

**12**th **STD.**

**PART - III BIOLOGY**

Register Number

TIME ALLOWED : 3.00 HOURS]      **(with Answers)**      [MAXIMUM MARKS : 70

## Instructions:

(1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

Note: Candidate should answer Part-I (Bio-Botany) & Part-II (Bio-Zoology) in separate answer-books.

## PART- I (BIO-BOTANY) (35 MARKS)

### SECTION – I

*Note :* (i)   Answer **all** the questions:    **(8 × 1 = 8)**

(ii)   Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer**.**

**1.** If a homozygous red flowered plant is crossed with a homozygous white flowered plant then the off-spring will be:

(a) All red flowered
(b) Half white flowered
(c) Half red flowered
(d) All white flowered

**2.** Name the plant which is pest resistant and saline tolerant:

(a) Sonalika      (b) Triticale
(c) *Rhaphanobrassica* (d)   Atomita - 2

**3.** Some of the major species cultivated in Agroforestry for commericial use:

(a) Erythrina, Albizzia
(b) Malaivembu, Kadambu
(c) Acacia, Azadirachta Indica
(d) Sesbania, Acacia

**4.** First cell of Male gametophyte in angiosperms is:

(a) Primary endosperm
(b) Microspore
(c) Megaspore      (d)   Nucleus

**5.** The Ozone layer of troposphere is called:

(a) Middle Ozone   (b)   Ozone Shield
(c) Bad Ozone      (d)   Good Ozone

**6.** Virus free plants are developed from:

(a) Cell suspension culture
(b) Organ culture   (c)   Meristem culture
(d) Protoplast culture

**7.** Which is frequently used as reporter of expression?

(a) GMF      (b)   Circular protein
(c) GFP      (d)   PLA

**8.** Match the following

| (1) | Stenobathic | (i) | Salinity |
| (2) | Stenoecious | (ii) | Depth of water / habitat |
| (3) | Stenohaline | (iii) | Food |
| (4) | Stenophagic | (iv) | Habitat selection |

(a) (1) - (iv), (2) - (i), (3) - (iii), (4) - (ii)
(b) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)
(c) (1) - (ii), (2) - (i), (3) - (iv), (4) - (iii)
(d) (1) - (ii), (2) - (iv), (3) - (i), (4) - (iii)

### SECTION – II

Answer **any four** of the following questions.

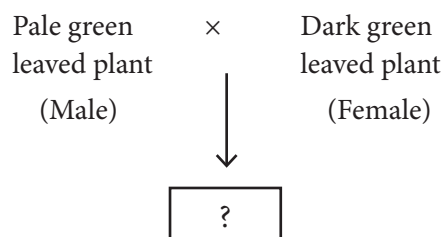**(4 × 2 = 8)**

**9.** Define Cybrid.
**10.** Write any four uses of Seedball.
**11.** What are the objectives of clean development mechanism?
**12.** Define - Organic farming.
**13.** Write the Botanical name and family of Nilavembu. Write any one of its uses.
**14.** Name the enzymes involved in genetic engineering.

### SECTION – III

Answer any three of the following questions. Question No. **19 is compulsory.**      **(3 × 3 = 9)**

**15.** In 4 o'clock plant

239

Pale green    ×    Dark green
leaved plant       leaved plant

(Male)          (Female)

↓

[ ? ]

Explain the type of inheritance.

**16.** What is $p^{BR\ 322}$ plasmid?

**17.** What is Green House Effect? Draw the relative contribution of green house gases.

**18.** Give an account on cryo preservation.

**19.** Write the three differences between Habitat and Niche.

## Sᴇᴄᴛɪᴏɴ – IV

**Answer all the questions**        **(2 × 5 = 10)**

**20.** (a) Explain the different mode of entry of pollen tube into the ovule.

**(OR)**

(b) What is gene mapping and write its uses.

**21.** (a) How to protect the ecosystem?

**(OR)**

(b) Ramu and Somu are farmers. Ramu cultivated the crops by fertiliztion method. Somu cultivated the crops from mixed population.

     (i)   Who will get new variety?

     (ii)   Write the advantages and disadvantages of their selection.

## Aɴsᴡᴇʀs

### Sᴇᴄᴛɪᴏɴ – I

**1.** (c) Half red flowered

**2.** (c) *Rhaphanobrassica*

**3.** (b) Malaivembu, Kadambu

**4.** (b) Microspore

**5.** (c) Bad Ozone

**6.** (c) Meristem culture

**7.** (c) GFP

**8.** (d) (1) - (ii), (2) - (iv), (3) - (i), (4) - (iii)

### Sᴇᴄᴛɪᴏɴ – II

**9.** The fusion product of protoplast without nucleus of different cells is called cybrid. This is formed during protoplast culture.

**10.** (i) Seed ball is an ancient Japanese technique of encasing seeds in a mixture of clay and soil humus (also in Cow dung) and scattering them on to suitable ground, not planting of trees manually.

(ii) This method is suitable for barren and degraded lands for tree regeneration and vegetation before monsoon period where the suitable dispersal agents become rare.

**11.** (i) Prevention of dangerous climate change.

(ii) Reduce green house gas emissions.

**12.** Organic farming is an alternative agricultural system in which plants/crops are cultivated in natural ways by using biological inputs to maintain soil fertility and ecological balance thereby minimizing pollution and wastage.
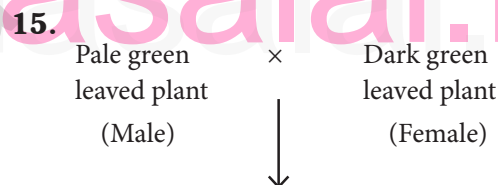
**13.** **Botanical name :** *Andrographis paniculata.*
**Family:** Acanthaceae
**Uses:** *Androgrophis* is a potent hepatoprotective and is widely used to treat liver disorders.

**14.** (i) Restriction Enzymes
     (a) Exonucleases
     (b) Endonucleases
(ii) Alkaline phosphatase
(iii) DNA Ligase

### Sᴇᴄᴛɪᴏɴ – III

**15.**

Pale green    ×    Dark green
leaved plant       leaved plant

(Male)          (Female)

↓

[ $F_1$ Dark Green leaved ]

**Chloroplast Inheritance:**

(i) It is found in 4 O' Clock plant (*Mirabilis jalapa*).

(ii) In this, there are two types of variegated leaves namely dark green leaved plants and pale green leaved plants.

(iii) When the pollen of dark green leaved plant (male) is transferred to the stigma of pale green leaved plant (female) and pollen of pale green leaved plant is transferred to the stigma of dark green leaved plant, the $F_1$ generation of both the crosses must be identical as per Mendelian inheritance.

(iv) But in the reciprocal cross the $F_1$ plant differs from each other.

## PART-II (BIO-ZOOLOGY)

### (MARKS : 35)

### SECTION – I

*Note :* (i)   Answer **all** the questions:          (8 × 1 = 8)

(ii)   Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer**.**

**1.** What Saccharomyces Cerevisiae is more suitable for production of recombinant interferons than *E.coli*?

(a) *E.coli* cannot be used in biofermentor.

(b) *E.coli* does not have suitable plasmid for the production of proteins.

(c) *E.coli* does not have the machinery for glycosylation of proteins.

(d) *E.coli* is not easily available for the production of proteins.

**2.** ELISA is mainly used for:

(a) Selecting plants having desired traits

(b) Detection of mutations

(c) Detection of pathogens

(d) Selecting animals having desired traits

**3.** **Assertion (A)** : Genetically engineered Bt-cotton is disease resistant type.

**Reason (R)** : Cry-toxin produced in the plant has specific activities against free living fungi.

(a) Both (A) and (R) are true, but (R) does not explain (A).

(b) (A) is wrong; (R) is correct

(c) Both (A) and (R) are wrong

(d) (A) is true but (R) is wrong

**4.** Which one of the following are at high risk of extinction due to habitat destruction?

(a) Echinoderms      (b)   Mammals

(c) Birds                   (d)   Amphibians

**5.** Identical twins are produced when the following conditions is satisfied:

(a) Two sperms are fertilizing one eggs

(b) Two sperms are fertilizing two eggs

(c) One sperm is fertilizing two eggs

(d) One sperm is fertilizing one egg

**6.** The difference between DNA sugars and RNA sugars is:

(a) One oxygen atom excess in deoxyribose sugars

(b) One oxygen atom less in ribose sugars

(c) Two oxygen atoms less in ribose sugars

(d) One oxygen atom less in deoxyribose sugars

**7.** Which one of the following is true to gastrulation?

(a) Formation of multicellular structure from Zygote.

(b) Formation of specific organs from germ layers.

(c) Formation of three germ layer embryo from single layer embryo.

(d) Attachment of blastocyst to the uterine wall.

**8.** Match the following:

| (1) | Copper releasing IUD | (i) | LNG - 20 |
| (2) | Hormone releasing IUD | (ii) | Lippes loop IUD |
| (3) | Non-medicated IUD | (iii) | Saheli |
| (4) | Mini pills | (iv) | Multiload - 375 |

(a) (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)

(b) (1) - (iv), (2) - (ii), (3) - (i), (4) - (iii)

(c) (1) - (iv), (2) - (i), (3) - (iii), (4) - (ii)

(d) (1) - (i), (2) - (iv), (3) - (ii), (4) - (iii)

### SECTION – II

Answer **any four** of the following questions.

(4 × 2 = 8)

**9.** What is Ovulation? In which day of menstrual cycle it takes place?

**10.** Write the cause of Down's Syndrome.

**11.** What are Operons? How many operon groups are present in E.coli?

**12.** Write any two differences between active and passive Immunity.

**13.** Which referred to as Industrial alcohol? Why?

**14.** What is the most important application of human stem cells?

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## SECTION – III

Answer any 3 of questions. Question No. **19 is compulsory.**          (3 × 3 = 9)

**15.** What is known as "Let-Down" reflex?

**16.** Write a note on "Amniocentesis".

**17.** Name the hormone secrete by Thymus gland and mention two function of that hormone.

**18.** Write about gene banks.

**19.** A character present in grandfather goes to grandson through daughter. Draw flowchart for this pattern of Inheritance.

## SECTION – IV

**Answer all the questions**          (2 × 5 = 10)

**20.** (a)    Write about the methodologies of HGP.

**(OR)**

(b)    Explain the evolutionary path of Man.

**21.** (a)    Write short notes on:

(i)    Population Density

(ii)    Natality and Mortality

**(OR)**

(b)    Write about the effects of chemicals used in the field of Agriculture.

## ANSWERS

### SECTION – I

**1.** (c)    *E.coli* does not have the machinery for glycosylation of proteins.

**2.** (c)    Detection of pathogens

**3.** (c)    Both (A) and (R) are wrong

**4.** (c)    Birds

**5.** (d)    One sperm is fertilizing one egg

**6.** (d)    One oxygen atom less in deoxyribose sugars

**7.** (c)    Formation of three germ layer embryo from single layer embryo.

**8.** (a)    (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)

### SECTION – II

**9.** (i)    The release of ovum by the rupture of the Graafian follicle is called ovulation.

(ii)    It occurs during ovulatory phase of menstrual cycle.

(iii)    14$^{th}$ day of menstrual cycle it takes place.

**10. Down's Syndrome:**

(i)    Chromosomal disorders are caused by errors in the number or structure of chromosomes.

(ii)    Chromosomal anomalies usually occur when there is an error in cell division.

**11.** The clusters of gene with related functions are called operons. They usually transcribe single mRNA molecules. In E.coli, nearly 260 genes are grouped into 75 different operons.

**12.**

| S. No. | Active Immunity | Passive Immunity |
|--------|-----------------|------------------|
| i. | Active immunity is produced actively by host's immune system. | Passive immunity is received passively and there is no active host participation. |
| ii. | It is produced due to contact with pathogen or by its antigen. | It is produced due to anti bodies obtained from outside. |

**13.** *Saccharomyces cerevisiae* is the major producer of ethanol ($C_2H_5OH$). It is used for industrial, laboratory and fuel purposes. So ethanol is referred to as industrial alcohol.

**14.** (i)    It can be used for cell based therapies.

(ii)    Human stem cells can be used to test new drugs.

### SECTION – III

**15.** Oxytocin causes the "Let-Down" reflex the actual ejection of milk from the alveoli of the mammary glands. During lactation, oxytocin also stimulates the recently emptied uterus to contract, helping it to return to pre - pregnancy size.

**16.** (i)    Amniocentesis is a prenatal technique.

(ii)    It is used to detect any chromosomal abnormalities in the foetus

**Reason for the statutory ban on this technique:**

(i)    It is being misused to determine the sex of the foetus.

(ii)    It creates chance of female foeticide.

**17.** (i)    Thymosine is the hormone secreted by thymus gland.

(ii)    It stimulates the T cell to become mature and immunocompetent.

(iii)    Also assists in the development of B-cells to plasma cells to produce antibodies.

**18.** (i)    Gene banks are a type of biorepository which preserve genetic materials. Seeds of different genetic strains of commercially important plants can be stored in long periods in seed banks, gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques.

# 12<sup>th</sup> STD.

## SURA'S MODEL QUESTION PAPER ⑤

### PART - III BIOLOGY

Register Number

TIME ALLOWED : 3.00 HOURS]          **(with Answers)**          [MAXIMUM MARKS : 70

**Instructions:**

(1)  Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2)  Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

Note: Candidate should answer Part-I (Bio-Botany) & Part-II (Bio-Zoology) in separate answer-books.

## PART- I (BIO-BOTANY) (35 MARKS)

### SECTION – I

*Note :* (i)  Answer **all** the questions:          (8 × 1 = 8)

(ii)  Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer**.**

**1.**  Select the period for Mendel's hybridization experiments
(a)  1856-1863
(b)  1850-1870
(c)  1857-1869
(d)  1870-1877

**2.**  Identify the correctly matched pair
(a)  Tuber          – *Allium Cepa*
(b)  Sucker         – *Pistia*
(c)  Rhizome        – *Musa*
(d)  Stolon         – *Zingiber*

**3.**  Consider the following statements:

I.  Recombinant DNA technology is popularly known as genetic engineering is a stream of biotechnology which deals with the manipulation of genetic materials by man invitro.

II.  pBR322 is the first artificial cloning vector developed in 1977 by Boliver and Rodriguez from E.coli plasmid.

III.  Restriction enzymes belongs to a class of enzymes called nucleases.

Choose the correct option regarding above statements.
(a)  I & II
(b)  I & III
(c)  II & III
(d)  I,II & III

**4.**  Which of the given plant produces cardiac glycosides?
(a)  *Calotropis*
(b)  *Acacia*
(c)  *Nepenthes*
(d)  *Utricularia*

**5.**  Which of the following is / are not a natural ecosystem?
(a)  Forest ecosystem
(b)  Rice field
(c)  Grassland ecosystem
(d)  Desert ecosystem

**6.**  One of the chief reasons among the following for the depletion in the number of species making endangered is
(a)  over hunting and poaching
(b)  green house effect
(c)  competition and predation
(d)  habitat destruction

**7.**  While studying the history of domestication of various cultivated plants _____ were recognized earlier.
(a)  Centres of origin
(b)  Centres of domestication
(c)  Centres of hybrid
(d)  Centres of variation

8.  The only cereal that has originated and domesticated from the New world.

    (a) *Oryza sativa*

    (b) *Triticum asetumn*

    (c) *Triticum duram*

    (d) *Zea mays*

## SECTION – II

Answer **any four** of the following.    (4 × 2 = 8)

9.  What is C-value?

10. What is a codon?

11. Write the advantages of herbicide tolerant crops.

12. What is Bio-pest repellent?

13. Construct the food chain with the following data. Hawk, plants, frog, snake, grasshopper.

14. How do sacred groves help in the conservation of biodiversity?

## SECTION – III

Answer any three of the following questions. Question No. **19 is compulsory.**    (3 × 3 = 9)

15. What are vectors?

16. What is bio-remediation? Give an example.

17. Which one gas is most abundant out of the four commonest greenhouse gases? Discuss the effect of this gas on the growth of plants?

18. Explain the best suited type followed by plant breeders at present.

19. What is Green house effect? What are the gases involved in it?

## SECTION – IV

Answer all the questions    (2 × 5 = 10)

20. (a) With a suitable diagram explain the structure of an ovule.

    **(OR)**

    (b) Differentiate incomplete dominance and codominance.

21. (a) What is soil profile? Explain the characters of different soil horizons.

    **(OR)**

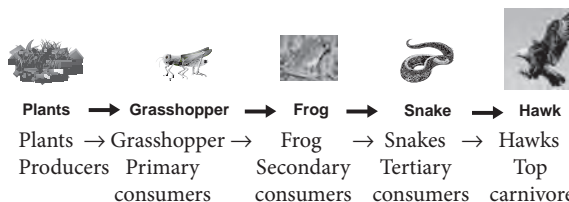    (b) Which TSM is widely practiced and culturally accepted in Tamil Nadu? -explain.

## ANSWERS

### SECTION – I

1.  (a) 1856-1863

2.  (c) Rhizome - *Musa*

3.  (b) I & III

4.  (a) Calotropis

5.  (b) Rice field

6.  (d) habitat destruction

7.  (a) Centres of origin

8.  (d) *Zea mays*

### SECTION – II

9.  Genome content of an organism is expressed in terms of number of base pairs or in terms of the content of DNA which is expressed as c-value.

10. DNA codes are referred to as triplet codes and those in mRNA is called as codons. Each triplet specifies a particular amino acid. There are 64 codons of which 61 codons codes for amino acids.

11. **Advantages of Herbicide Tolerant Crops:**

    (i) Weed control improves higher crop yields.

    (ii) Reduces spray of herbicide.

    (iii) Reduces competition between crop plant and weed.

12. Botanical pest repellent and insecticide made with the dried leaves of Azadirachta indica.

13.



Plants ➡ Grasshopper ➡ Frog ➡ Snake ➡ Hawk

| Plants → | Grasshopper → | Frog → | Snakes → | Hawks |
|---|---|---|---|---|
| Producers | Primary consumers | Secondary consumers | Tertiary consumers | Top carnivores |

14. (i) Sacred groves are the patches or grove of cultivated trees which are community protected and are based on strong religious belief systems

    (ii) These groves provide a number of ecosystem services to the neighbourhood like protecting watershed, fodder, medicinal plants and micro climate control.

## SECTION – III

**15.** A vector is a small DNA molecule capable of selfreplication and is used as a carrier and transporter of DNA fragment which is inserted into it for cloning experiments. Vector is also called cloning

**16. Bioremediation:** It is defined as the use of microorganisms or plants to clean up environmental pollution.

　Some examples of bioremediation technologies are:

(i)　Phytoremediation

(ii)　Mycoremediation

(iii)　Bioventing

(iv)　Bioleaching

**17.** $CO_2$ (Carbon dioxide) is the most abundant among green house gases.

　**Effects on Growth of plants:**

(i)　Low agricultural productivity in tropics.

(ii)　Frequent heat waves (Weeds, pests, fungi need warmer temperature).

(iii)　Increase of vectors and epidemics.

(iv)　Strong storms and intense flood damage.

(v)　Water crisis and decreased irrigation.

(vi)　Change in flowering seasons and pollinators.

(vii)　Change in species distributional ranges

(viii)　Species extinction

**18.** Conventional plant breeding methods resulting in hybrid varieties had a tremendous impact on agricultural productivity over the last decades. It develops new plant varieties by the process of selection and seeks to achieve expression of genetic material which is already present within the species.

　The following are the types of conventional plant breeding methods:

(i)　Plant Introduction method

(ii)　Selection method

(iii)　Hybridization method

(iv)　Heterosis method

(v)　Mutation Breeding method

(vi)　Polyploid Breeding

(vii)　Green Revolution method

**19.** (i)　Green House Effect is a process by which radiant heat from the Sun is captured by gases in the atmosphere that increase the temperature of the Earth ultimately.

(ii)　The gases that capture heat are called Green House Gases which include carbon dioxide ($CO_2$), methane ($CH_4$), Nitrous Oxide ($N_2O$) and a variety of manufactured chemicals like chlorofluorocarbon (CFC). Increase in greenhouse gases lead to irreversible changes in major ecosystems and climate patterns

## SECTION – IV

**20. (a)** Ovule is also called megasporangium and is protected by one or two covering called integuments..

(i)　A mature ovule consists of a stalk and a body. Stalk or **funiculus** is present at the base and it attaches the ovule to the placenta.

(ii)　The point of attachment of funicle to the body of the ovule is known as **hilum**. It represents the junction between ovule and funicle.

(iii)　In an inverted ovule, the funicle is adnate to the body of the ovule forming a ridge called **raphe**.
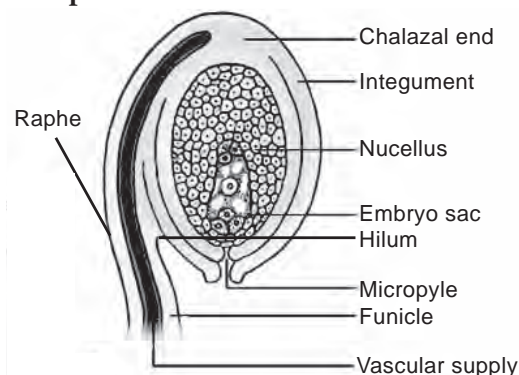


**Structure of ovule**

(iv)　Body of the ovule is made up of central mass of parenchymatous tissue called **nucellus**, has large reserve food materials.

(v)　Nucellus is enveloped by one or two protective coverings called **integuments**.

(vi)　Integuments encloses the nucellus completely but forms a pore at the top called **micropyle**.

(vii) Ovule with one or two integuments are said to be **unitegmic** or **bitegmic** ovules.

(viii) The basal region of the body of the ovule where the nucellus, the integument and the funicle merge is called as **chalaza**.

(ix) Large, oval, sac-like structure in the nucellus toward the micropylar end called **embryo sac** or **female gametophyte**.

(x) It develops from the functional megaspore formed within the nucellus.

(xi) In some species (unitegmic tenuinucellate), the inner layer of the integument may become specialised to perform the nutritive function for the embryo sac and is called as **endothelium** or **integumentary tapetum Example :** Asteraceae.

Two types of ovule based on the position of the sporogenous cell.

(a) **Tenuinucellate type:**

1. Sporogenous cell is hypodermal with a single layer of nucellar tissue around it.

2. It has very small nucellus.

(b) **Crassinucellate type:**

1. Ovules with **subhypodermal sporogenous cell**.

2. It has fairly large nucellus.

(xii) Group of cells found at the base of the ovule between the chalaza and embryo sac is called **hypostase**.

(xiii) Thick-walled cells found above the micropylar end above the embryo sac is called **epistase**.

**(OR)**

**(b)**

|   | Incomplete dominance | Codominance |
|---|---|---|
| 1. | One allele is not completely dominant to another allele, it shows incomplete dominance. | The phenomenon in which two alleles are both expressed in the heterozygous individual. |
| 2. | Cross does not exhibit the character of the dominant parent. | Hybrid shows the presence of both the types of proteins similar to their parents. |
| 3. | It produces a fine mixture of the expression of two alleles. | No blending effect of the two alleles. |
| 4. | Produce new phenotype. | Does not produce new phenotype. |
| 5. | Both parental alleles can be observed in the off spring. | Neither parental alleles can be observed in the offspring. |
| 6. | Qualitative approach of the gene expression. | Quantitative approach of both incompletely dominant alleles. |
| 7. | **Ex.** 4' O Clock plant (*Mirabilis Jalpa*). | **Ex.** Red and white flowers of *Camellia* inheritance of sickle cell haemoglobin, ABO blood group. |

**21. (a)** Soil is commonly stratified into horizons at **different depth**. These layers differ in their physical, chemical and biological properties. This succession of **super-imposed horizons** is called **soil profile**.

**Characters of different soil horizons:**

| Horizon | Description |
|---|---|
| O–Horizon (Organic horizon) Humus | It consists of fresh or partially decomposed organic matter.<br>O1 – Freshly fallen leaves, twigs, flowers and fruits<br>O2 – Dead plants, animals and their excreta decomposed by micro-organisms. Usually absent in agricultural and deserts. |
| A–Horizon (Leached horizon)<br>Topsoil - Often rich in humus and minerals. | It consists of top soil with humus, living creatures and inorganic minerals.<br>A1 – Dark and rich in organic matter because of mixture of organic and mineral matters.<br>A2 – Light coloured layer with large sized mineral particles. |
| B-Horizon (Accumulation horizon) (Subsoil-Poor in humus, rich in minerals) | It consists of iron, aluminium and silica rich clay organic compounds. |
| C - Horizon (Partially weathered horizon) Weathered rock Fragments - Little or no plant or animal life. | It consists of parent materials of soil, composed of little amount of organic matters without life forms. |
| R – Horizon<br>(Parent material) Bedrock | It is a parent bed rock upon which underground water is found. |

**(OR)**

**(b) Siddha system of medicine:**

(i)    Siddha is the most popular, widely practiced and culturally accepted system in Tamil Nadu.

(ii)   It is based on the texts written by 18 Siddhars.

(iii)  The entire knowledge is documented in the form of poems in Tamil.

(iv)   Siddha is principally based on the Pancabūta philosophy.

(v)    According to this system, three humors Vātam, Pittam and Kapam are responsible for the health of human beings and any disturbance in the equilibrium of these humors result in ill health.

(vi)   The drug sources of Siddha are plants, animal parts, marine products and minerals.

(vii)  This system specializes in using minerals for preparing drugs with the long shelf-life.

(viii) This system uses about 800 herbs as source of drugs.

(ix)   Great stress is laid on disease prevention, health promotion, rejuvenation and cure.

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## PART-II (BIO-ZOOLOGY)

### (MARKS : 35)

### SECTION – I

*Note :* (i)   Answer **all** the questions:        (8 × 1 = 8)
   (ii)  Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer**.**

**1.** Competition between species leads to
   (a)   Extinction
   (b)   Mutation
   (c)   Amensalism
   (d)   Symbiosis

**2.** Which of the following is the correct sequence of event with reference to the central dogma?
   (a)   Transcription, Translation, Replication
   (b)   Transcription, Replication, Translation
   (c)   Duplication, Translation, Transcription
   (d)   Replication, Transcription, Translation

**3.** Which of the following was the contribution of Hugo de Vries?
   a)   Theory of mutation
   b)   Theory of natural Selection
   c)   Theory of inheritance of acquired characters
   d)   Germplasm theory

**4.** Recombinant Factor VIII is produced in the _____ cells of the Chinese Hamster.
   (a)   Liver cells
   (b)   blood cells
   (c)   ovarian cells
   (d)   brain cells.

**5.** Find the wrongly matched pair
   (a)   Bleeding phase   - fall in oestrogen and progesterone
   (b)   Follicular phase   - rise in oestrogen
   (c)   Luteal phase   - rise in FSH level
   (d)   Ovulatory phase   - LH surge

**6.** The first clinical gene therapy was done for the treatment of
   (a)   AIDS
   (b)   Cancer
   (c)   Cystic fibrosis
   (d)   SCID

**7.** Which of the following forests is known as the lungs of the planet earth?
   (a)   Tundra forest
   (b)   Rain forest of north east India
   (c)   Taiga forests
   (d)   Amazon rain forest

**8.** The approach which does not give the defined action of contraceptive is

| (a) | Hormonal contraceptive | Prevents entry of sperms, prevent ovulation and fertilization |
|---|---|---|
| (b) | Vasectomy | Prevents spermatogenesis |
| (c) | Barrier method | Prevents fertilization |
| (d) | Intra uterine device | Increases phagocytosis of sperms, suppresses sperm motility and fertilizing capacity of sperms |

### SECTION – II

Answer **any four** of the following.        (4 × 2 = 8)

**9.** Expand the acronyms
   a. FSH      b. LH      c. hCG      d. hPL

**10.** What is amniocentesis? Why a statutory ban is imposed on this technique?

**11.** Name and explain the type of barriers which involve macrophages.

**12.** What is genetically engineered insulin?

**13.** Classify the aquatic biomes of Earth.

**14.** Define the term 'Super bug'.

### SECTION – III

Answer any 3 of questions. Question No. **19 is compulsory.**        (3 × 3 = 9)

**15.** How is juvenile phase different from reproductive phase?

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**16.** Name the hormones produced from the placenta during pregnancy..

**17.** State any three goals of the human genome project.

**18.** (i) Write the scientific name of the filarial worm that causes filariasis.

(ii) Write the symptoms of filariasis.

(iii) How is this disease transmitted?.

**19.** Differentiate between Somatic cell gene therapy and germline gene therapy.

### Section – IV

**Answer all the questions** (2 × 5 = 10)

**20.** (a) What is a Vaccine? Explain its types.

**(OR)**

(b) What are called Medical wastes? Write a note on its management and the methods of disposal.

**21.** (a) Explain stabilizing, directional and disruptive selection with examples.

**(OR)**

(b) Differentiate between Tundra and Taiga Biomes

### Answers

### Section – I

**1.** (a) Extinction

**2.** (d) Replication, Transcription, Translation

**3.** (a) Theory of mutation

**4.** (c) ovarian cells

**5.** (c) Luteal phase - rise in FSH level

**6.** (c) Cystic fibrosis

**7.** (d) Amazon rain forest

**8.** (b) Vasectomy - Prevents spermatogenesis

### Section – II

**9.** (a) FSH – Follicular Stimulating Hormone

(b) LH – Lutenizing Hormone

(c) hCG – Human Chorionic Gonadotropin

(d) hPL – Human Placental Lactogen.

**10.** (i) Amniocentesis is a prenatal technique.

(ii) It is used to detect any chromosomal abnormalities in the foetus

**Reason for the statutory ban on this technique:**

(i) It is being misused to determine the sex of the foetus.

(ii) It creates chance of female foeticide.

**11.** (i) The type of barrier that involves macrophages are the phagocytic barriers which is a type of innate immunity.

(ii) In this mechanism, specialised cells such as monocytes, neutrophils and tissue macrophages phagocytose and digest whole microorganisms are involved.

**12.** (i) The insulin which is obtained by recombinant DNA technology is called genetically engineered insulin.

(ii) This involves the insertion of human insulin gene on the plasmids of *Escherichia Coli*.

(iii) Insulin was the first pharmaceutical product of recombinant DNA technology.

**13.** Aquatic biomes of Earth can be classified as follows:

(i) Freshwater (Lakes, ponds and rivers).

(ii) Brackish water (Estuaries and Wetlands).

(iii) Marine (Coral reefs, pelagic zones and abyssal zones).

**14.** "Superbug" is a term used to describe strains of bacteria that are resistant to the majority of antibiotics commonly used today.

### Section – III

**15.**

| Juvenile phase | Reproductive phase |
|---|---|
| Juvenile phase/ vegetative phase is the period of growth between the birth of the individual upto reproductive maturity. | During reproductive phase/ maturity phase the organisms reproduce and their offsprings reach maturity period. |

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**16.** Hormones produced by the placenta during pregnancy are:

   (i) human Chorionic Gonadotropin (hCG)

   (ii) human Chorionic Somatomammotropin (hCS)

   (iii) human Placental Lactogen (hPL)

   (iv) Oestrogens

   (v) Progesterone

   (vi) Relaxin

**17.** (i) Identify all the genes (approximately 30000) in human DNA.

   (ii) Determine the sequence of the 3 billion chemical base pairs that makeup the human DNA.

   (iii) To store this information in databases.

   (iv) Transfer related technologies to other sectors, such as industries.

   (v) Improve tools for analysis.

**18.** (i) Scientific name of Filarial Worm that causes filariasis is "*Wuchereria bancrofti*".

   (ii) **Symptoms of filariasis:**

     (a) The accumulation of the worms in lymph glands block the lymphatic system resulting in inflammation of the lymph nodes.

     (b) In some cases, the obstruction of lymph vessels causes elephantiasis or filariasis of the limbs, scrotum and mammary glands.

   (iii) The disease is transmitted by female *Culex* mosquito, when the mosquito bites a infected person and then bites a healthy person.

**19.**

| S. No. | SOMATIC CELL GENE THERAPY | GERM LINE GENE THERAPY |
|---|---|---|
| i. | Therapeutic genes transferred into the somatic cells. | Therapeutic genes transferred into the germ cells. |
| ii. | Introduction of genes into bone marrow cells, blood cells, skin cells etc., | Genes introduced into eggs and sperms. |
| iii. | Will not be inherited in later generations. | Heritable and passed on to later generations. |

## Sᴇᴄᴛɪᴏɴ – IV

**20.** **(a)** A vaccine is a **biological preparation that provides active acquired immunity** to a particular disease and resembles a disease-causing microorganism and is often made from weakened or attenuated or killed forms of the microbes, their toxins, or one of its surface proteins.

**Types:**

**First generation vaccine:**

   (i) **Live attenuated vaccine:**

     Use the weakend, aged or less virulent form of virus. Eg: MMR vaccine.

   (ii) **Killed vaccine:**

     Killed for inactivated by heat. Eg: Salk's polio vaccine.

   (iii) **Toxoid vaccine:**

     Contain toxin or chemical secreted by bacteria or virus. Eg: DPT vaccine.

**Second generation vaccine:**

Contains pure surface antigen of pathogen. Eg: Hepatitis-B-vaccine.

**Third generation vaccine:**

Contains the purest of the highest potency vaccine. Eg: DNA or recombinant vaccine.

**(OR)**

**(b) Medical waste :**

(i) Any kind of waste that contains infectious material generated by hospitals, laboratories, medical research centers, Pharmaceutical companies and Veterinary clinics are called medical wastes.

(ii) Medical wastes contain body fluids like blood, urine, body parts and other contaminants, culture dishes, glasswares, bandages, gloves, discarded needles, scalpels, swabs and tissues.

**Management:**

The safe and sustainable management of biomedical waste is the social and legal responsibilities of people working in healthcare centers.

**Waste disposal:**

Involved by incineration, chemical disinfection, autoclaving, encapsulation, microwave irradiation are methods of waste disposals. Final disposal includes landfill and burying as per norms inside premises.

**21. (a)**

**1) Stabilising Selection:**

(i) Operates in a stable environment.

(ii) The organisms with average phenotypes survive whereas the extreme individuals from both the ends are eliminated.

(iii) There is no specification.

**Eg.** Measurements of sparrows that survived the storm clustered around the mean, and the sparrows that failed to survive the storm clustered around the extremes of the variation showing stabilizing selection.

**2) Directional Selection:**
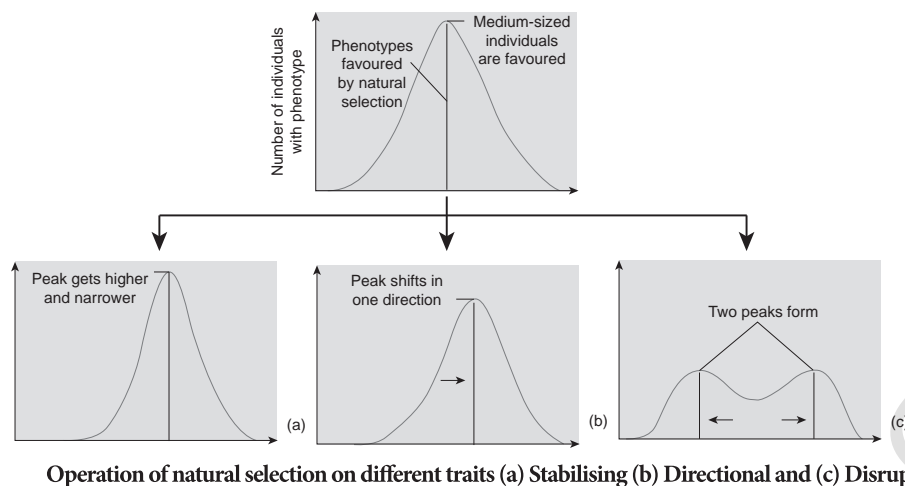
(i) The environment which undergoes gradual change is subjected to directional selection.

(ii) This type of selection removes the individuals from one end towards the other end of phenotypic distribution.

**Eg.** Size differences between male and female sparrows. Both male and female look alike externally but differ in body weight. Females show directional selection in relation to body weight.

**3) Disruptive Selection (centrifugal selection):**

(i) When homogenous environment changes into heterogenous environment this type of selection is operational.

(ii) The organisms of both the extreme phenotypes are selected whereas individuals with average phenotype are eliminated.

(iii) This results in splitting of the population into sub population/species.

(iv) This is a rare form of selection but leads to formation of two or more different species. It is also called adaptive radiation.

**E.g.** Darwin's finches-beak size in relation to seed size inhabiting Galapagos islands.

Operation of natural selection on different traits (a) Stabilising (b) Directional and (c) Disruptive

**(OR)**

**(b)**

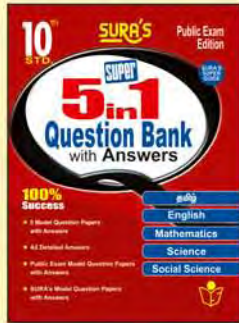| No. | Tundra Biomes | Taiga Biomes |
|---|---|---|
| 1. | This is almost treeless plain in the northern parts of Asia, Europe and North America. | The Taiga is 1300 - 1400 km wide zone south of the Tundra |
| 2. | Winters are long with little daylight, summers are short with long daylight hours. | This area has long and cold winters. Summer temperature ranges from 10°c to 21°c. |
| 3. | Precipitation is less than 250 mm per year. It is a zone of permafrost | Precipitation ranges between 380-1000 mm annually. |
| 4. | Dwarf willows, birches, mosses, grasses, sedges are the flora here. | The Taiga is a forest of coniferous trees such as spruce, fir and pine. |
| 5. | Reindeer, Arctic hare, Musk ox, Lemmings are Tundra herbivores. Carnivores are the Arctic fox, Arctic wolf, Bobcat and Snowy owl. Polar bears live along coastal areas. | Migratory herbivores include Moose, Elk, Deer and Reindeer. Smaller mammals are herbivorous squirrels, Snowshoe hare and predatory pine martens. Predators include the timber wolf, grizzly bear, black bear, bobcat and wolverines. |
| 6. | Moose and Reindeer migrate to Tundra for summer. | Moose and Reindeer migrate to Taiga for winter. |

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# SURA'S
# Question Bank
## with Answers

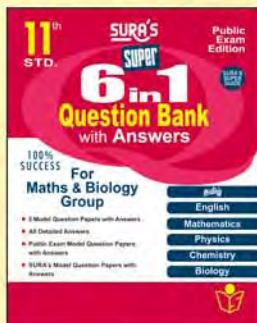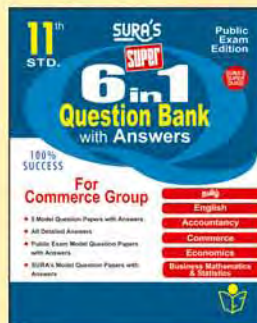**For 10th, 11th & 12th Std.**

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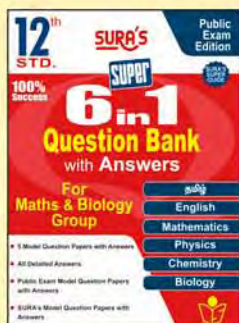- **SURA's Model Question Papers with Answers**

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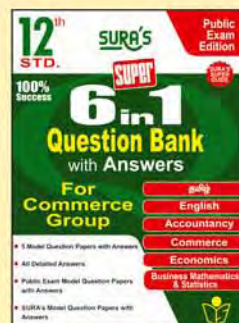6-in-1 Question Bank _EM
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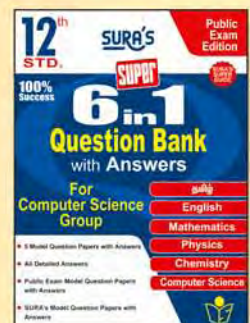6-in-1 Question Bank _EM
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