

मराठी, इंग्रजी, सामान्य अध्ययन आणि अभियांत्रिकी अभियोग्यता चाचणी

एकूण प्रश्न : 100

वेळ : 1½ (दीड) तास

एकूण गुण : 100

### सूचना

- (1) सदर प्रश्नपुस्तिकेत 100 अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.
- (2) आपला परीक्षा-क्रमांक ह्या चौकोनांत न विसरता बॉलपेनने लिहावा.
 

परीक्षा-क्रमांक									

केंद्राची संकेताक्षरे

शेवटचा अंक
- (3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे न विसरता नमूद करावा.
- (4) (अ) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला 4 पर्यायी उत्तरे सुचविली असून त्यांना 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या चार उत्तरापैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर छायांकित करून दर्शाविला जाईल याची काळजी घ्यावी. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.
- (ब) आयोगाने ज्या विषयासाठी मराठी बरोबर इंग्रजी माध्यम विहित केलेले आहे. त्याच विषयाचा प्रत्येक प्रश्न मराठी बरोबर इंग्रजी भाषेत देखील छापण्यात आला आहे. त्यामधील इंग्रजीतील किंवा मराठीतील प्रश्नामध्ये मुद्रणदोषांमुळे अथवा अन्य कारणामुळे विसंगती निर्माण झाल्याची शंका आल्यास, उमेदवाराने संबंधित प्रश्न पर्यायी भाषेतील प्रश्नाशी ताडून पहावा.
- (5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. धाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नाकडे वळावे. अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.
- (6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.
- (7) प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरापैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".

### ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-82" यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

**पुढील उतारावाचून त्यावर आधारित 1 ते 5 प्रश्नांची उत्तरे द्या :**

सांप्रत काळी हिंदु लोक गरीब आहेत व अज्ञानी आहेत, एतद्विषयी मी सिद्धान्त लिहितो की, संपदा आणि ज्ञान ही दोन्ही, जोपर्यंत यांस आपली स्थिती कळली नाही तोपर्यंत प्राप्त होणार नाहीत. जरी हा देश उत्तम प्रकारचे उत्पन्न करणारा, व धनधान्यसमृद्धिकर्ता आहे, तरी या लोकांस त्याचे फळ नाही.

आतां पृथ्वीवर दुसरे अनेक देश आहेत. त्यांची अवस्थाही फार वाईट आहे. रयत लोक इकडल्यापेक्षा तेथे दरिद्री आहेत; परंतु हे उदाहरण या देशास उपयोगी नाही. कारण की, हा देश पूर्वी कसा होता व हल्लीं कसा आहे, तें पाहून विचार केला पाहिजे. किती एक लोक असे आहेत की, मुसलमानांचे राज्यास नांव ठेवित नाहीत; परंतु इंग्रजांचे राज्य विशेषेकरून दरिद्रास कारण समजतात व त्यांस कांही नवीन शहाणपणाची युक्ति सांगितली, तर ऐकत नाहीत आणि म्हणतात की, आम्हांस आजपर्यंत या युक्ति कोठें होत्या ? आजपर्यंत आम्ही दुःखी नव्हतो; आतां मात्र झालो, ते इंग्रजांमुळे झालो. यास्तव या युक्तीनें आमचे दारिद्र्य जाणार नाही, इंग्रज जातील तर मात्र जाईल. असे समजून युक्तीस बहुत लोक अगदीं मानीत नाहीत. फक्त हें राज्य वाईट, असें म्हणून संध्याकाळपासून उजाडेपर्यंत, आणि उजाडल्यापासून सारा दिवसभर जप करितात.

या प्रकारचे लोक आम्ही नित्य पहातो. तेव्हा अशा लोकांची समजूत पाडणें हे सर्वांहून अवघड आहे; परंतु पहा की, असा विचार करीत बसणें मूर्खपणाचें आहे. उद्योगास झटणें हा शहाणपणा आहे. दारिद्र्य आहे खरें, व तें पदोपदी वृद्धिंगत होत चाललें आहे. द्रव्यांचे साधन कमी होत चाललें आहे; परंतु अशा जपानें उपाय होणार नाही. जर विद्या व ज्ञान येणेंकरून आपलें दारिद्र्य कमी केलें, तरच होईल. ज्ञान जेथें आहे, तेथें सर्व पराक्रम आहे; परंतु हिंदु लोकांमध्ये एकमत असेल, तर या गोष्टी घडतील. आपल्यापासून आपली कंठाळ एखादा घेऊन गेला, तर जागेवर बसून शिव्या दिल्या तर कंठाळ येईल कीं काय ? यास्तव जे नेणारे आहेत, ते परत देण्यास अनुकूल करण्याचे जे प्रयत्न असतील, ते करावे. ते तरी शहाणपणाखेरीज कसे सांपडतील, यास्तव शहाणपण मुख्य पाहिजे. त्याचे योगानें दारिद्र्य कमी होईल.

या देशांतील लोकांनी विलायतेस जावें, तेथें वस्ती करावी. विद्या शिकावी. जे श्रीमंत आहेत, त्यांनी या कामांत द्रव्य खर्चावें, तिकडील ज्ञानाची वृद्धि करावी. तिकडील कलाकौशल्य इकडे आणावे; आपल्या दुष्ट चाली सोडाव्या, हेच शहाणपण आहे. या शहाणपणानें लोकांस समर्थता येईल. आणि समर्थतेनंतर दारिद्र्य जाईल. मुख्य ज्ञानापासून सर्व पराक्रम आहेत. कधीं कधीं ज्ञानाबरोबर लागलेच पराक्रम दृष्टोत्पत्तीस येत नाहीत. कारण की, किती एक मूर्ख असून, अधिकार पावतात, तेव्हा त्यांस अधिकार कसा मिळाला ? हा प्रश्न बहुतेक हिंदु लोक करितात; परंतु हा केवळ पोरकट प्रश्न आहे. पराक्रमाची रीति अशी आहे की, जो कोणी घरांत प्रमुख शहाणा असतो, तो बहुत द्रव्य संपादन करतो. नंतर त्याचे विभाग पश्चात् किंवा केंव्हा तरी होतात. तेव्हा त्यांतील एक विभाग अयोग्य पुरुषाच्या हातीं लागतो, म्हणून कोणी जर असें म्हटलें की, हें सर्व मूर्खपणानें संपादन केलें आहे, तर ही गोष्ट सत्य नाही.

1. लेखकाच्या मते हिंदु लोक गरीब आणि अज्ञानी असण्याची कारणे काय आहेत ?

- (1) संपदा आणि ज्ञान यांचा अभाव
- (2) इंग्रजांच्या राजवटीमुळे
- (3) मुसलमान राजांच्या सत्तेमुळे
- (4) द्रव्याचे साधन कमी होत असल्यामुळे

2. वरील उताऱ्यास योग्य शीर्षक द्या.

- (1) हिंदु लोकांचे दारिद्र्य
- (2) शहाणपणाशिवाय प्रगती नाही
- (3) संपत्तीज्ञानाचा संगम
- (4) ज्ञान हाच पराक्रम

3. श्रीमंत लोकांकडून लेखकाची काय अपेक्षा आहे ?

- (1) पराक्रम करून सामर्थ्य प्राप्त करावे
- (2) इंग्रजांना दूषणे देत रहावे
- (3) संपत्ती खर्चून विलायतेतील ज्ञान व कलाकौशल्ये इकडे आणावीत
- (4) संपत्तीचा संचय करून समर्थ व्हावे

4. लेखकाच्या मते दारिद्र्य कमी होण्याचा मार्ग कोणता ?

- (1) द्रव्याचे संपादन करणे
- (2) विद्या व ज्ञान संपादन करणे
- (3) इंग्रजांना हाकलून लावणे
- (4) दुष्ट चालीरीतींचा त्याग करणे

5. या उताऱ्याची मध्यवर्ती संकल्पना काय आहे ?

- (1) इंग्रजांना हाकलून लावणे
- (2) ज्ञानाने जग जिंकता येते
- (3) दारिद्र्यावर मात केल्यास समर्थ बनता येते
- (4) दुष्ट चालीरीतींचा त्याग करणे

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

6. शब्दाला जोडून आलेल्या अव्ययांना काय म्हणतात ?

- (1) उभयान्वयी अव्यये
- (2) शब्दयोगी अव्यये
- (3) क्रियाविशेषण अव्यये
- (4) केवळ प्रयोगी अव्यये

7. 'संकेतार्थी वाक्ये' कोणत्या अव्ययावरून ओळखावीत ?

- (1) आणि - व
- (2) म्हणून - यास्तव
- (3) परंतु - पण
- (4) जर - तर

8. खालीलपैकी अयोग्य पर्याय निवडा.

- (1) स्थिरस्थाय
- (2) व्रतवैकल्य
- (3) गैरसोय
- (4) न्यायनिवाडा

9. 'पार्वती' या शब्दाचा समानार्थी शब्द कोणता ?

- (1) लक्ष्मी
- (2) अंबा
- (3) गौरी
- (4) सरस्वती

10. 'न्यायाधीशाकडून दंड आकारण्यात आला.' या वाक्यातील प्रयोग ओळखा.

- a. कर्मकर्तरी प्रयोग
  - b. कर्मभाव संकर प्रयोग
  - c. कर्मणी प्रयोग
  - d. भावे प्रयोग
- (1) फक्त d बरोबर बाकी सर्व चूक
  - (2) b आणि c बरोबर बाकी सर्व चूक
  - (3) a आणि c बरोबर बाकी सर्व चूक
  - (4) फक्त a बरोबर बाकी सर्व चूक

11. Match the following sentences with correct prepositions to fill in the blanks :

- |          |  |
|----------|--|
| a. to    | I. The river flowed _____ a bridge.                    |
| b. after | II. The repairs _____ the roof were completed quickly. |
| c. with  | III. _____ the party we did a lot of washing-up.       |
| d. under | IV. The bad-tempered man replied _____ a grunt.        |

- |     | a  | b   | c   | d   |
|-----|----|-----|-----|-----|
| (1) | IV | I   | III | II  |
| (2) | II | III | IV  | I   |
| (3) | II | III | I   | IV  |
| (4) | I  | IV  | II  | III |

12. Match the following :

- |               |                                   |
|---------------|-----------------------------------|
| a. Come again | I. to advance, develop or improve |
| b. Come about | II. to obtain or receive          |
| c. Come by    | III. to happen                    |
| d. Come along | IV. What did you say ?            |

- |     | a   | b   | c   | d   |
|-----|-----|-----|-----|-----|
| (1) | I   | II  | III | IV  |
| (2) | IV  | III | II  | I   |
| (3) | III | IV  | II  | I   |
| (4) | II  | I   | IV  | III |

13. I met unexpectedly an old friend yesterday at the bus station.

Select the correct alternative that could replace the underlined part meaningfully.

- |               |                 |
|---------------|-----------------|
| (1) caught at | (2) came across |
| (3) waited on | (4) went by     |

14. \_\_\_\_\_ parents sat up half the night.

Which one of the following correctly fills the blank in the above sentence ?

- |              |              |
|--------------|--------------|
| (1) Both of  | (2) Both the |
| (3) The both | (4) Both     |

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

15. a. The accident was put down to bad luck.  
b. I really love being given presents.  
c. Tom was liked to be there.  
d. She is being treated in hospital.

Identify the correct passive sentence/s.

- (1) Only a (2) Only a, b and c  
(3) Only b, c and d (4) Only a, c and d

---

**Read the following passage carefully and answer the questions from 16 to 20 :**

A person who takes the trouble to form his own opinions and beliefs, will feel that he owes no responsibility to the majority for his conclusions. If he is a genuine lover of truth, if he is inspired by a passion for seeing things as they are and an adherence of holding ideas which do not conform to facts, he will be wholly independent of the assent of those around him. When he proceeds to apply his beliefs in the practical conduct of life, the position is different. There are then good reasons why his attitude should be less inflexible. The society in which he is placed is an ancient and composite growth. The people from whom he dissents have not come by their opinions, customs and by a process of mere haphazard. These opinions and customs, all had their origin in a certain real supposed fitness. They have certain depth of root in the lives of a proportion of the existing generation. Their congruity with one another may have come to an end. That is only one side of the truth. The most zealous propagandism cannot penetrate to them. In common language, we speak of a generation as something possessed of a kind of exact unity, with all its parts and members homogeneous. Yet, plainly it is not this. It is a whole but a whole in a state of constant flux; its factors and elements are eternally shifting. It is not one but many generations. Each of the seven ages of man is neighbour to all the rest. The column of the veterans is already sinking into the last abyss, while the column of the newest recruits is forming its tradition, its tendency and its possibilities. Only a proportion of each can have nerve enough to grasp the banner of a new truth and endurance to bear it along rugged and untrodden ways. Thus we must remember the stuff of which life is made. We must consider what an overwhelming preponderance of the most tenacious energies and most concentrated interests of a society must be absorbed between material cares and the solitude of the affections. It is obviously unreasonable to lose patience and quarrel with one's time because it is tardy in throwing off its institutions and beliefs and slow to achieve the transformation which is the problem in front of it. Men and women have to live. The task for most of us is arduous enough to make us well pleased with even such imperfect shelter as we find in daily use and wont. To insist on whole community being made at once to submit to the reign of new practices and ideas that have just begun to commend themselves to the most advanced speculative intelligence of the time, this even if it were a possible process, would do hurry on social dissolution.

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कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

16. Select the correct antonym from the passage to miscellaneous

- (1) whole (2) homogeneous  
(3) tenacious (4) different
- 

17. 'rugged and untrodden ways' in the passage means

- (1) rough and outdated  
(2) difficult and inexperienced  
(3) hard and worn out  
(4) strong and strange
- 

18. What is the hard task the author refers to in the above passage ?

- a. To discard old beliefs for transformation.  
b. To accept new practices and ideas.  
c. To be absorbed between material cares and solitude of affection.

Select the correct answer.

- (1) Only a  
(2) Only b  
(3) Only b and c  
(4) All a, b and c
- 

19. An overnight change in social setting is not desirable because

- a. The society in which the person lives is an ancient and of composite growth.  
b. The opinions and customs in the society are deep rooted.

Select the correct alternative to complete the sentence.

- (1) Only a is correct  
(2) Only b is correct  
(3) Both a and b are correct  
(4) Both a and b are incorrect
- 

20. According to the passage, customs and traditions originate from

- (1) lives of ancient people in the society.  
(2) the traditional society.  
(3) largely in previous generations.  
(4) real and flawless connectivity among the majority of the members of existing society.
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



21. आदिवासींकडून शेती करण्यासाठी वापरल्या जाणाऱ्या या पद्धतीमुळे नैसर्गिक जंगले व मृदा यांचा न्हास होत आहे
- (1) पायऱ्या पायऱ्यांची शेती (2) तोडा व जाळा  
(3) वनशेती (4) उदरनिर्वाहाची शेती
- There is a degradation of natural forest and soil due to this method used by the tribals for farming :
- (1) Terrace farming (2) Slash and burn  
(3) Agro-forestry (4) Subsistence agriculture

22. साधन संपत्तीच्या संवर्धन संकल्पनेत खालीलपैकी कोणत्या एकाचा समावेश होत **नाही** ?
- (1) काळजीपूर्वक वापर (2) प्रमाणशीर वापर  
(3) वापर न करणे (4) वाया जाण्यापासून त्यांना वाचविणे
- Which one of the following does **not** include in the concept of conservation of resources ?
- (1) Careful use (2) Rational use  
(3) Not to use (4) Preservation from destruction

23. खालीलपैकी कोणता एक निर्देशांकाचा घटक **नाही** ?
- (1) अपेक्षित आयुष्यमान (2) रस्ते व ग्रामीण विकास  
(3) साक्षरता (4) बालमृत्यु
- Which of the following is **not** a factor of index ?
- (1) Life Expectancy (2) Road and Rural Development  
(3) Literacy (4) Infant Mortality

24. खालील विधाने विचारात घ्या :
- अ. भारतीय व्यापार वृद्धी संघटनेची स्थापना जानेवारी 1992 मध्ये झाली.  
ब. राज्य व्यापार महामंडळाची स्थापना प्रामुख्याने आंतर-राज्य व्यापारासाठी झाली.  
क. भारतीय माल अविष्टी संस्था ही अविष्टीत उद्योगाच्या कच्च्या मालावर संशोधन करते.  
वरीलपैकी कोणते/ती विधान/ने **चुकीचे/ची** आहे/आहेत ?
- (1) फक्त अ आणि ब (2) फक्त ब  
(3) फक्त क (4) फक्त अ आणि क
- Consider the following statements :
- a. India Trade Promotion Organisation was set up in January 1992.  
b. State Trading Corporation was set up primarily to deal in trade with inter-states.  
c. The Indian Institute of Packaging undertakes research on raw materials for the packaging industry.
- Which of the statements given above is/are **incorrect** ?
- (1) Only a and b (2) Only b  
(3) Only c (4) Only a and c

25. याचना बाजारा संबंधीत खालीलपैकी कोणते विधान योग्य **नाही** ?

- (1) याचना बाजार मुंबई, कोलकाता आणि चेन्नई यथे केंद्रित आहे.
- (2) याचना बाजाराला आंतर बँक याचना बाजार असे म्हणतात.
- (3) याचना बाजार हा नाणेबाजारातील रोखतेच्या स्थितीचा अधिक योग्य निर्देशांक आहे.
- (4) याचना बाजारात देवाण घेवाणाचे व्यवहार तीन दिवसां करिता चालविले जातात.

Which of the following statements regarding call money market is **not** correct ?

- (1) Call money market is centred in Mumbai, Kolkata and Chennai.
- (2) Call money market is also known as Inter bank market.
- (3) Call money market is the most appropriate indicator of liquidity position of money market.
- (4) Borrowing/lending transactions in call money market are carried out for three days.

26. सन 2012 – 13 मध्ये पेट्रोलियम निर्यातदार देशांकडून (OPEC) होणारी भारताची आयात \_\_\_\_\_ टक्के होती.

- (1) 30
- (2) 38.6
- (3) 29
- (4) 25

India's import from Petroleum Export Countries (OPEC) was \_\_\_\_\_ percent (%) in the year 2012 – 13.

- (1) 30
- (2) 38.6
- (3) 29
- (4) 25

27. खालील विधाने विचारात घ्या :

- अ. घाऊक किंमत निर्देशांकामध्ये अर्थव्यवस्थेतील विस्तृत भाववाढीचे मापण केले झाले.
- ब. ग्राहक किंमत निर्देशांकामध्ये लोकांच्या प्रत्यक्ष उपभोग्य वस्तू व सेवांच्या किरकोळ किंमतीच्या सरासरीचे मापण केले जाते.
- क. स्थूल देशांतर्गत उत्पादन भाववाढ किजी किंमत वाढ आणि व्यक्तिगत उत्पन्नातील वृद्धी यातील फरक होय.

वरीलपैकी कोणते/ती विधान/ने **असत्य** आहे/आहेत ?

- (1) फक्त अ आणि ब
- (2) फक्त क
- (3) फक्त अ
- (4) फक्त ब आणि क

Consider the following statements :

- a. The wholesale price index is thus a measure of inflation on an economy wide scale.
- b. The consumer price index is the retail price average of a basket of goods and services directly consumed by the people.
- c. GDP deflators which distinguishes between personal growth in income and price rise.

Which of the statements given above is/are **incorrect** ?

- (1) Only a and b
- (2) Only c
- (3) Only a
- (4) Only b and c

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

28. खालील जोड्या जुळवा :

	अ (योजना)	ब (स्थापना वर्ष)
अ.	स्वर्ण जयंती ग्राम स्वरोजगार योजना	I. डिसेंबर 1997
ब.	जवाहर ग्राम समृद्धी योजना	II. सप्टेंबर 2005
क.	राष्ट्रीय ग्रामीण रोजगार हमी कायदा	III. एप्रिल 1999
ड.	स्वर्ण जयंती शहरी रोजगार योजना	IV. 1 एप्रिल 1999

	अ	ब	क	ड
(1)	I	II	III	IV
(2)	I	III	IV	II
(3)	IV	III	II	I
(4)	III	I	II	IV

Match the following pairs :

	A (Yojana)	B (Est. Year)
a.	Swarna Jayanti Gram Swarozgar Yojana	I. December 1997
b.	Jawahar Gram Samridhi Yojana	II. September 2005
c.	National Rural Employment Guarantee Act	III. April 1999
d.	The Swarna Jayanti Shahari Rozgar Yojana	IV. 1 April 1999

	a	b	c	d
(1)	I	II	III	IV
(2)	I	III	IV	II
(3)	IV	III	II	I
(4)	III	I	II	IV

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

29. खालील विधाने विचारात घ्या :

- अ. 1953 मध्ये केंद्र सरकारने राज्य पुनर्रचना आयोगाची स्थापना केली.  
 ब. 2014 मध्ये भारतीय संसदेने आंध्र प्रदेश पुनर्रचना कायद्याला मंजूरी दिली.  
 क. तेलंगाना हे भारतातील 29 वे राज्य आहे.  
 ड. तेलंगाना राज्याची निर्मिती 2 जून 2014 रोजी झाली.

वरीलपैकी कोणती विधाने बरोबर आहेत ?

- (1) फक्त अ आणि ब (2) फक्त ब आणि क  
 (3) फक्त क आणि ड (4) अ, ब, क आणि ड

Consider the following statements :

- a. The State Reorganisation Commission was established by the Central Government in 1953.  
 b. The Andhra Pradesh Reorganisation Act was approved by the Indian Parliament in 2014.  
 c. Telangana is the 29<sup>th</sup> State of India.  
 d. Telangana State was established on 2<sup>nd</sup> June 2014.

Which of the statements given above are correct ?

- (1) Only a and b (2) Only b and c  
 (3) Only c and d (4) a, b, c and d

30. खालीलपैकी कोणत्या जोड्या बरोबर आहेत ?

- | अ                     | ब                                  |
|-----------------------|------------------------------------|
| (घटनादुरुस्ती)        | (विषय)                             |
| अ. 52 वी घटनादुरुस्ती | - पक्षांतर बंदी कायदा              |
| ब. 56 वी घटनादुरुस्ती | - गोव्याला राज्य दर्जा             |
| क. 59 वी घटनादुरुस्ती | - पंजाब मध्ये आणिबाणी              |
| ड. 62 वी घटनादुरुस्ती | - अनुसूचित जाती - जमातीसाठी आरक्षण |
| (1) अ, ब आणि ड        | (2) अ, ब आणि क                     |
| (3) क आणि ड           | (4) अ, ब, क आणि ड                  |

Which of the following pairs are correctly matched ?

- | A                             | B                             |
|-------------------------------|-------------------------------|
| (Amendment)                   | (Subject)                     |
| a. 52 <sup>nd</sup> Amendment | - Anti-defection Law          |
| b. 56 <sup>th</sup> Amendment | - Statehood for Goa           |
| c. 59 <sup>th</sup> Amendment | - Emergency in Punjab         |
| d. 62 <sup>nd</sup> Amendment | - Reservation for SCs and STs |
| (1) a, b and d                | (2) a, b and c                |
| (3) c and d                   | (4) a, b, c and d             |

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

31. खालील योजनांपैकी कोणती योजना ही प्रधानमंत्री योजना या नावाने ओळखली जात नाही ?

- |                  |                            |
|------------------|----------------------------|
| (1) मुद्रा योजना | (2) जीवन ज्योती बीमा योजना |
| (3) जन धन योजना  | (4) यापैकी नाही            |

Which one of the following schemes is **not** recognized as Prime Minister's Scheme ?

- |                     |                             |
|---------------------|-----------------------------|
| (1) Mudra Yojana    | (2) Jivan Jyoti Bima Yojana |
| (3) Jan Dhan Yojana | (4) None of the above       |

32. खालील विधाने लक्षात घ्या :

- अ. डॉ. बाबासाहेब आंबेडकर यांना मरणोत्तर "भारत रत्न" पुरस्कार देण्यात आला.  
 ब. महात्मा गांधी यांना "भारत रत्न" पुरस्कार देण्यात आला होता.  
 क. पं. मदन मोहन मालवीय यांना 2016 मध्ये "भारत रत्न" पुरस्कार देण्यात आला.  
 ड. सचिन तेंदुलकर यांना 2014 मध्ये "भारत रत्न" पुरस्कार देण्यात आला.  
 वरीलपैकी कोणते विधान/विधाने **चूक** आहेत ?

- |                  |                  |
|------------------|------------------|
| (1) फक्त अ       | (2) फक्त ड       |
| (3) फक्त ब आणि क | (4) फक्त अ आणि ड |

Consider the following statements :

- a. Dr. Babasaheb Ambedkar was awarded with Bharat Ratna posthumously.  
 b. Mahatma Gandhi was awarded Bharat Ratna.  
 c. Pt. Madan Mohan Malviya was awarded Bharat Ratna in 2016.  
 d. Sachin Tendulkar was awarded Bharat Ratna in 2014.

Which of the statements given above is/are **incorrect** ?

- |                  |                  |
|------------------|------------------|
| (1) Only a       | (2) Only d       |
| (3) Only b and c | (4) Only a and d |

33. स्वच्छ सर्वेक्षण 2017 अंतर्गत नवी मुंबई आणि पुणे या शहरांचा अनुक्रमे कितवा क्रमांक आहे ?

- |               |               |
|---------------|---------------|
| (1) 08 आणि 13 | (2) 29 आणि 32 |
| (3) 40 आणि 45 | (4) 56 आणि 72 |

What is the ranking of Navi Mumbai and Pune cities as per the Swachha Sarvekshan 2017 ?

- |               |               |
|---------------|---------------|
| (1) 08 and 13 | (2) 29 and 32 |
| (3) 40 and 45 | (4) 56 and 72 |

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

34. निवडणूक सुधारणेशी संबंधित समिती/समित्या \_\_\_\_\_ आहे/आहेत.  
 अ. दिनेश गोस्वामी समिती  
 ब. इंद्रजीत गुप्ता समिती  
 (1) फक्त अ (2) फक्त ब  
 (3) अ आणि ब दोन्हीही (4) वरीलपैकी एकही नाही

The committee/s regarding the electoral reform/s is/are

- a. Dinesh Goswami Committee  
 b. Indrajit Gupta Committee  
 (1) Only a (2) Only b  
 (3) Both a and b (4) None of the above

35. मिखाईल कलाशिनिकोव्ह यांचे निधन झाले, ते कोण होते ?  
 अ. 'स्टॅलिन प्राइज' ने गौरविलेले  
 ब. 'ऑर्डर ऑफ लेनिन' ने गौरविलेले  
 क. 'हिरो ऑफ सोशलिस्ट लेबर' ने गौरविलेले  
 ड. 'एके-47' चे जनक  
 (1) अ, ब बरोबर, क, ड चूक (2) ब, क बरोबर, अ, ड चूक  
 (3) ब, क आणि ड बरोबर, अ चूक (4) सर्व बरोबर

Mikhael Kalashnichov passed away, who was he ?

- a. Honoured by 'Stalin Prize'  
 b. Honoured by 'Order of Lenin'  
 c. Honoured by 'Hero of Socialist Labour'  
 d. Father of 'AK-47'  
 (1) a, b are correct, c, d are false (2) b, c are correct, a, d are false  
 (3) b, c and d are correct, a is false (4) All are correct

36. मोनोरेलच्या पहिल्या टप्प्याच्या खालील वैशिष्ट्यांपैकी कोणते बरोबर नाही ?

- (1) प्रत्येक मोनोरेलला चार डबे आहेत.  
 (2) एकूण सात स्थानके आहेत.  
 (3) प्रवासाचा एकूण कालावधी वीस मिनिटे आहे.  
 (4) एक डबा फक्त महिलांसाठी राखीव आहे.

Which of the following features of the first phase of monorail is **not** correct ?

- (1) Every monorail has four coaches.  
 (2) Total stations are seven.  
 (3) Total time of journey is twenty minutes.  
 (4) One coach is reserved for ladies only.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

37. संयुक्त राष्ट्र संघाने 1977 मध्ये नैरोबी येथे कोणत्या विषयावर परिषद घेतली होती ?
- (1) वन्यप्राणी संरक्षण
  - (2) जल प्रदूषण
  - (3) वाळवंटीकरण
  - (4) ओझोन पातळीतील घट

What was the subject of the conference organised by the United Nations in 1977 at Nairobi ?

- (1) Protection of wildlife
- (2) Water pollution
- (3) Desertification
- (4) Depletion of ozone

- 
38. किनारा नियमन क्षेत्र अधिसूचना ही किनारी प्रदेशाच्या पर्यावरण संरक्षणासाठी काढलेली आहे. अंदमान आणि निकोबार द्वीप समुहासाठी कोणती किनारा नियमन क्षेत्र अधिसूचना लागू आहे ?

- (1) किनारा नियमन क्षेत्र अधिसूचना-I
- (2) किनारा नियमन क्षेत्र अधिसूचना-II
- (3) किनारा नियमन क्षेत्र अधिसूचना-III
- (4) किनारा नियमन क्षेत्र अधिसूचना-IV

Coastal Regulation Zone (CRZ) notification was published for the environmental protection of coastal areas.

Which of the following CRZ notifications is applicable to Andaman and Nicobar islands ?

- (1) Coastal Regulation Zone Notification-I
- (2) Coastal Regulation Zone Notification-II
- (3) Coastal Regulation Zone Notification-III
- (4) Coastal Regulation Zone Notification-IV

39. जोड्या लावा :

अ		ब	
अ.	बेहरामजी मलबारी	I.	सक्तीचे वैधव्य
ब.	करनदास मुळजी	II.	सत्य प्रकाश
क.	शिवराम कांबळे	III.	सोमवंशीय मित्र
ड.	वि.दा. सावरकर	IV.	जात्युच्छेदक निबंध

	अ	ब	क	ड
(1)	IV	III	II	I
(2)	I	II	III	IV
(3)	II	IV	I	III
(4)	III	I	IV	II

Match the pairs :

A		B	
a.	Behramaji Malbari	I.	Saktiche Vaidhavya
b.	Karandas Moolji	II.	Satya Prakash
c.	Shivram Kamble	III.	Somvanshiya Mitra
d.	V.D. Savarkar	IV.	Jatyuchhedak Nibandh

	a	b	c	d
(1)	IV	III	II	I
(2)	I	II	III	IV
(3)	II	IV	I	III
(4)	III	I	IV	II

40. दहशतवादाचे उच्चाटन करण्यासाठीचा प्रादेशिक करार सार्कच्या \_\_\_\_\_ येथे भरलेल्या अधिवेशनात केला गेला.

- |                 |              |
|-----------------|--------------|
| (1) क्वालालंपूर | (2) काठमांडू |
| (3) बंगलोर      | (4) कोलंबो   |

The SAARC Summit held in \_\_\_\_\_ witnessed the signing of the SAARC Regional Convention on Suppression of Terrorism.

- |                 |               |
|-----------------|---------------|
| (1) Kualalumpur | (2) Kathmandu |
| (3) Bangalore   | (4) Colombo   |

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK





48. A small ball is shot vertically upward from the top of a building 25 m above ground with initial velocity 9.81 m/sec. Determine the maximum height the ball will reach.
- (1) 29.9 m (2) 40 m  
(3) 38.9 m (4) 7 m
- 
49. In moment summation, the moment of the resultant force about point O is equal to the sum of
- (1) all the couple moments in the system  
(2) moment of the forces in the system about point O  
(3) Both (1) and (2) points above  
(4) None of these
- 
50. Two trains 'A' and 'B' are moving on parallel tracks in opposite directions. The velocity of 'A' is twice that of 'B'. They take 18 seconds to cross each other. What are the velocities of trains A and B ? Take length of train A as 240 m and that of B as 300 m.
- (1) Velocity of A is 72 kmph and velocity of B is 36 kmph  
(2) Velocity of A is 80 kmph and velocity of B is 40 kmph  
(3) Velocity of A is 36 kmph and velocity of B is 18 kmph  
(4) Velocity of A is 29 kmph and velocity of B is 58 kmph
- 
51. Experiments with sliding block indicate that the magnitude of the kinetic friction force is \_\_\_\_\_ to the magnitude of the resultant normal force.
- (1) directly proportional (2) inversely proportional  
(3) equal (4) None of these
- 
52. \_\_\_\_\_ states that the algebraic sum of moments of two unequal forces about any point in their plane is equal to the moment of their resultant about that point.
- (1) Lami's theorem (2) Varignon's theorem  
(3) D' Alembert's theorem (4) Polygon law of forces
- 
53. In dry friction, the frictional force acts \_\_\_\_\_ to the contacting surfaces in a direction opposed to the motion or tendency for motion of one surface relative to another.
- (1) tangent (2) normal  
(3) tangent and normal (4) None of these
- 
54. Kinetic energy during collision is lost due to
- (1) Heat generation (2) Sound generation  
(3) Vibration of colliding bodies (4) All of the above

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

55. A projecting stone which is usually provided to serve as support for roof truss, beam, weather shed, etc. is known as

- (1) String Course (2) Coping  
(3) Cornice (4) Corbel
- 

56. If tensile stresses in concrete are neutralised by introducing initial compressive stresses, such concrete is known as

- (1) Reinforced cement concrete  
(2) Prestressed cement concrete  
(3) Fibre-reinforced cement concrete  
(4) Prefabricated cement concrete
- 

57. The maximum eccentricity in a rectangular foundation of width 'b' for no tension in masonry should *not* exceed

- (1)  $b/2$  (2)  $b/3$   
(3)  $b/4$  (4)  $b/6$
- 

58. The key word to GIS technology is

- (1) Geography (2) Geology  
(3) Geomorphology (4) Geometeorology
- 

59. The primary need for automation on construction sites is

- (1) Fierce competition among construction contractors  
(2) Concerns for short term profits  
(3) Protect humans from safety and health hazards  
(4) Easy availability of computer technology
- 

60. A surveyor measured the distance between two points (A and B) on the plan drawn to a scale of 1 cm = 30 m and the result was 512 m. Later, however, he discovered that he used a scale of 1 cm = 10 m. Find the true distance between points A and B.

- (1) 1024 m (2) 1250 m  
(3) 1536 m (4) 2048 m
-

61. The number of different plain scales recommended by IS 1491 – 1959 for the use of engineers are
- (1) Three
  - (2) Four
  - (3) Five
  - (4) Six
- 
62. Contour lines of different elevations can unite to form one line only in the case of
- (1) Ridge
  - (2) Valley
  - (3) Vertical cliff
  - (4) Hill
- 
63. When it is not possible to set up the levelling instrument between the points, the type of levelling to be used is
- (1) Fly levelling
  - (2) Differential levelling
  - (3) Reciprocal levelling
  - (4) Profile levelling
- 
64. A level is set up in between two points A and B. Elevation of point A is 201.100 m (i.e. B.M.). If the B.S. reading taken on point A is 2.225 m and F.S. reading taken on point B is 1.895 m, then what is the elevation of point B ?
- (1) 201.430 m
  - (2) 203.325 m
  - (3) 205.220 m
  - (4) 199.205 m

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कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

65. In modern terminology, the performance of refrigerators and air-conditioners is expressed in terms of Energy Efficiency Rating (EER). The relation between EER and Coefficient of Performance (COP) is

- (1)  $EER = 4.312 COP$  (2)  $COP = 4.312 EER$   
(3)  $EER = 3.412 COP$  (4)  $COP = 3.412 EER$

66. Heat transfer by conduction takes place according to

- (1) Fourier's law  
(2) Newton's law of heating  
(3) First law of thermodynamics  
(4) Stefan-Boltzmann law

67. A heavy nucleus split into two or more lighter nuclei is known as

- (1) Fusion (2) Fission  
(3) Radioactivity (4) None of the above

68. Thrust ball bearing carries

- (1) radial load only (2) thrust load only  
(3) radial and thrust load (4) None of the above

69. In hydroelectric power plants, \_\_\_\_\_ provides an accelerating head which increases the velocity of flow in the pipeline corresponding to the increased demand by the turbine.

- a. Spillways  
b. Surge tanks  
c. Forebay  
d. Penstock

Which of the above is/are correct ?

- (1) Only a (2) Only b or c  
(3) Only d (4) Only a and d

70. Which of the following are the inversions of double Slider Crank Chain mechanism ?
- Scotch yoke and Oscillating cylinder engine
  - Oldham's coupling and Hand pump
  - Elliptical trammel and Oldham's coupling
  - Whitworth quick-return mechanism and Scotch yoke

Which of the above is/are correct ?

- |                  |                  |
|------------------|------------------|
| (1) Only a and b | (2) Only d       |
| (3) Only c       | (4) Only c and d |
- 

71. Material selection criteria for the connecting rod of an I.C. engine capable to withstand fluctuating stresses is
- |                       |                       |
|-----------------------|-----------------------|
| (1) Endurance limit   | (2) Yield strength    |
| (3) Ultimate strength | (4) None of the above |
- 

72. Which casting defect occur due to excess moisture content in moulding sand ?
- |                |                |
|----------------|----------------|
| (1) Porosity   | (2) Shrinkage  |
| (3) Blow holes | (4) Inclusions |
- 

73. \_\_\_\_\_ is the best cutting angle of twist drill used for drilling brass material workpiece.
- |          |          |
|----------|----------|
| (1) 125° | (2) 111° |
| (3) 118° | (4) 120° |
- 

74. The amount of taper in a workpiece is usually specified by the ratio of
- Large diameter of taper to its length
  - Small diameter of taper to its length
  - Difference in diameters of taper to its length
  - None of the above
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

75. Thevenin's theorem can be applied to networks containing

- (1) Passive elements only
  - (2) Active elements only
  - (3) Linear elements only
  - (4) All of these
- 

76. When a Q-factor of a circuit is low, then

- (1) power factor of the circuit is low
  - (2) impedance to resistance ratio of the circuit is low
  - (3) bandwidth is zero
  - (4) None of the above
- 

77. In a balanced star-connected system, line voltages are \_\_\_\_\_ ahead of their respective phase voltage.

- |          |                       |
|----------|-----------------------|
| (1) 30°  | (2) 60°               |
| (3) 120° | (4) None of the above |
- 

78. The superposition theorem is essentially based on

- |                 |                       |
|-----------------|-----------------------|
| (1) Reciprocity | (2) Linearity         |
| (3) Duality     | (4) None of the above |
- 

79. The purpose of oil in high rating transformer is for

- a. lubrication of core.
- b. insulation.
- c. cooling of transformer.
- d. providing fuel for operation.

Which of the above statements is/are correct ?

- |                  |                     |
|------------------|---------------------|
| (1) Only a and b | (2) Only b, c and d |
| (3) Only b       | (4) Only b and c    |
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

80. While measuring the power in a three-phase load by two-wattmeter method, the readings of the wattmeters will be equal and opposite when
- (1) the power factor is unity
  - (2) the load is balanced
  - (3) the phase angle is between  $60^\circ$  and  $90^\circ$
  - (4) the load is purely inductive
- 
81. The iron loss in a 10 kVA transformer is 1 kW and the full load copper losses are 2 kW. The maximum efficiency occurs at a load of
- (1) 14.1 kVA
  - (2) 7.07 kVA
  - (3) 5 kVA
  - (4) 7.07 kW
- 
82. The power in a three-phase circuit is measured by the two-wattmeter method. The reading indicated on the two wattmeters are  $W_1$  and  $W_2$ . The total power in the circuit is not given by
- (1)  $W_1 + W_2$
  - (2)  $W_1 - W_2$
  - (3)  $\sqrt{3} V_L I_L \cos \phi$
  - (4)  $3 V_{ph} I_{ph} \cos \phi$
- 
83. The equation for 25 cycles per second current sine wave having RMS value of 30 Ampere, will be
- (1)  $30 \sin (25t)$
  - (2)  $30 \sin (25\pi t)$
  - (3)  $42.4 \sin (25\pi t)$
  - (4)  $42.4 \sin (50\pi t)$
- 
84. How is the form factor for sinusoidal alternating quantities with  $I_m$  as the peak value expressed ?
- (1)  $K_f = \frac{0.637 I_m}{0.707 I_m}$
  - (2)  $K_f = \frac{0.707 I_m}{0.637 I_m}$
  - (3)  $K_f = \frac{0.707 I_m}{I_m}$
  - (4)  $K_f = \frac{I_m}{0.707 I_m}$

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



85. The area enclosed between the straight line  $y = x$  and the parabola  $y = x^2$  in the  $x$ - $y$  plane is

- (1)  $\frac{1}{6}$  (2)  $\frac{1}{4}$   
 (3)  $\frac{1}{3}$  (4)  $\frac{1}{2}$

86. The quadratic approximation of  $f(x) = x^3 - 3x^2 - 5$  at the point  $x = 0$  is

- (1)  $3x^2 - 6x - 5$  (2)  $-3x^2 - 5$   
 (3)  $-3x^2 + 6x + 5$  (4)  $3x^2 - 5$

87. A cubic polynomial with real coefficients

- (1) can possibly have no extrema and non-zero crossings  
 (2) may have up to three extrema and up to 2 zero crossings  
 (3) cannot have more than two extrema and more than three zero crossings  
 (4) will always have an equal number of extrema and zero crossings

88. As  $x$  varies from  $-1$  to  $3$ , which one of the following describes the behaviour of the function  $f(x) = x^3 - 3x^2 + 1$ ?

- (1)  $f(x)$  increases monotonically  
 (2)  $f(x)$  increases, then decreases and increases again  
 (3)  $f(x)$  decreases, then increases and decreases again  
 (4)  $f(x)$  increases and then decreases

89. If  $z = e^{ax+by} f(ax-by)$ , then  $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y}$  equals to

- (1)  $2abz$  (2)  $-2abz$   
 (3)  $-2az$  (4)  $abz$

90. Let  $A$  be an  $n \times n$  matrix with rank  $r$  ( $0 < r < n$ ). Then  $AX = 0$  has  $\rho$  independent solutions, where  $\rho$  is

- (1)  $r$  (2)  $n$   
 (3)  $n - r$  (4)  $n + r$

91. How is the crest factor of alternating quantities expressed ?

$$(1) K_p = \frac{0.637 I_m}{1.1}$$

$$(2) K_p = \frac{0.707 I_m}{0.637 I_m}$$

$$(3) K_p = \frac{I_m}{0.707 I_m}$$

$$(4) K_p = \frac{0.637 I_m}{0.707 I_m}$$

92. The value of  $\int_c \vec{F} \cdot d\vec{r}$  for  $\vec{F} = 3x^2\vec{i} + (2xz - y)\vec{j} + z\vec{k}$  passing through the straight line joining (0, 0, 0) and (2, 1, 3) is

$$(1) 24$$

$$(2) 16$$

$$(3) 12$$

$$(4) 32$$

93. Expansion of  $(1+x)^{1/x}$  up to the term containing  $x^2$  is given as

$$(1) e \left[ 1 - \frac{x}{2} + \frac{11}{24} x^2 + \dots \right]$$

$$(2) e \left[ 1 - \frac{x}{2} - \frac{11}{24} x^2 + \dots \right]$$

$$(3) e \left[ 1 + \frac{x}{2} + \frac{11}{24} x^2 + \dots \right]$$

$$(4) e \left[ 1 - \frac{x}{2} + \frac{13}{24} x^2 + \dots \right]$$

94. The minimum value of  $xy + a^3 \left( \frac{1}{x} + \frac{1}{y} \right)$  is

$$(1) 2a^3$$

$$(2) 3a^2$$

$$(3) a^2$$

$$(4) 2a^2$$

95. Find for what value of k, the set of equations

$$2x - 3y + 6z - 5t = 3$$

$$y - 4z + t = 1$$

$$4x - 5y + 8z - 9t = k$$

has an infinite number of solutions for equal to

$$(1) 8$$

$$(2) 5$$

$$(3) 7$$

$$(4) 6$$

96. If  $x = e^u \tan v$ ,  $y = e^u \sec v$ , then the value of  $\left( x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} \right) \cdot \left( x \frac{\partial v}{\partial x} + y \frac{\partial v}{\partial y} \right)$  is

$$(1) \text{ Zero}$$

$$(2) \text{ Unity}$$

$$(3) \text{ One and half}$$

$$(4) \text{ Half}$$

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97. Cauchy's homogeneous linear differential form is given as

$$x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 5y = x^2 \sin(\log x), \text{ then the particular integral will be}$$

(1)  $\frac{1}{2} e^{-2z} z \cos z$

(2)  $\frac{1}{2} e^{2z} \cos z$

(3)  $-\frac{1}{2} e^{2z} z \cos z$

(4)  $-\frac{1}{2} e^{-2z} \cos z$

98. For  $(D^2 + 4D + 3)y = 3e^{2x}$ , the particular integral is

(1)  $\frac{1}{15} e^{2x}$

(2)  $\frac{1}{5} e^{2x}$

(3)  $3e^{2x}$

(4)  $c_1 e^{-x} + c_2 e^{-3x}$

99.  $\int_0^1 x^p (\log x)^n dx$  is equal to

(1)  $\frac{n!}{(p+1)^{n+1}}$

(2)  $\frac{(-1)^n n!}{(p+1)^{n+1}}$

(3)  $\frac{(-1)^n n!}{(p+1)^{n+1}}$

(4)  $\frac{(-1)^n n!}{(p-1)^{n+1}}$

100. The volume of the region enclosed by the cone  $z = \sqrt{x^2 + y^2}$  and paraboloid  $z = x^2 + y^2$  is

(1)  $\frac{\pi}{6}$

(2)  $\frac{\pi}{8}$

(3)  $\frac{\pi}{12}$

(4)  $\frac{\pi}{9}$

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## सूचना — (पृष्ठ 1 वरून पुढे.....)

- (8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या “परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82” यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.
- (9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वतःबरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. मात्र परीक्षाकक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.

## नमुना प्रश्न

प्र. क्र. 201. सतीची चाल नष्ट करण्यासाठी कोणी मूलतः प्रयत्न केले ?

- |                           |                           |
|---------------------------|---------------------------|
| (1) स्वामी दयानंद सरस्वती | (2) ईश्वरचंद्र विद्यासागर |
| (3) राजा राममोहन रॉय      | (4) गोपाळकृष्ण गोखले      |

ह्या प्रश्नाचे योग्य उत्तर “(3) राजा राममोहन रॉय” असे आहे. त्यामुळे या प्रश्नाचे उत्तर “(3)” होईल, यास्तव खालीलप्रमाणे प्रश्न क्र. 201 समोरील उत्तर-क्रमांक “(3)” हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. 201. ①      ②      ●      ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तर-क्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगामार्फत “ महाराष्ट्र अभियांत्रिकी सेवा (पूर्व) परीक्षा - 2017” या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ज्ञांचे अभिप्राय विचारात घेऊन आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

## उत्तरतालिका - KEY

प्रश्न क्रमांक	उत्तरे			
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प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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50	1	1	3	2

7<sup>th</sup> September, 2017

प्रश्न क्रमांक	उत्तरे			
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प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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97	3	1	4	1
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100	1	4	1	3

7<sup>th</sup> September, 2017

प्रश्नपुस्तिका क्रमांक

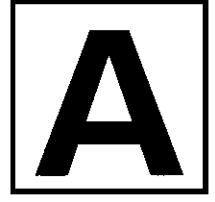
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दि 17 डिसेंबर 2017

103941

प्रश्नपुस्तिका-I

संच क्र.



Q10

स्थापत्य अधियांत्रिकी पेपर - 1

एकूण प्रश्न : 100

एकूण गुण : 200

वेळ : 2 (दोन) तास

### सूचना

- (1) सदर प्रश्नपुस्तिकेत 100 अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.
- (2) आपला परीक्षा-क्रमांक ह्या चौकोनांत न विसरता बॉलपेनने लिहावा.
- (3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे न विसरता नमूद करावा.
- (4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला 4 पर्यायी उत्तरे सुचविली असून त्यांना 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर छायांकित करून दर्शविला जाईल याची काळजी घ्यावी. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.
- (5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नांकडे वळावे. अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.
- (6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.
- (7) प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवारांच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".

### ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-82" यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा

पर्यवेक्षकांच्या सूचनेशिवाय हे सील उघडू नये

SEAL ★ SE

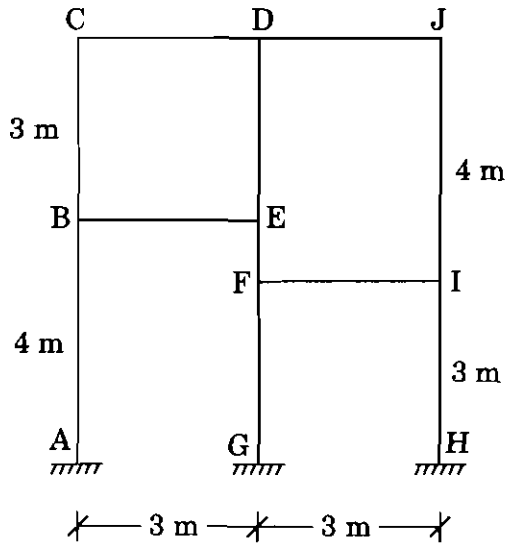
कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



A

Q10

1. Determine the degree of static and kinematic indeterminacy of the frame structure as shown in the figure.



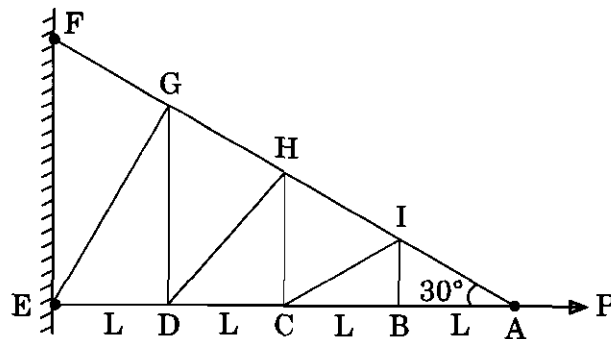
(1) 15, 8

(2) 12, 12

(3) 12, 10

(4) 15, 9

2. A cantilever truss as shown in the figure is subjected to a horizontal load 'P' at joint A. The total number of zero force members in the truss is



(1) 6

(2) 4

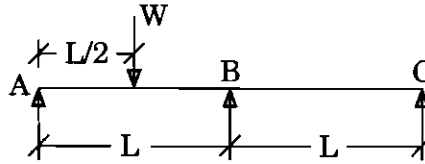
(3) 9

(4) 10

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

3. A continuous beam ABC is as shown in the figure. End supports are simple (i.e., A and C) and span AB = span BC = L. There is a concentrated load 'W' at the centre of the span AB while no load over the span BC.  $E_j$  is same for both the spans. What is the moment at the continuous support B?



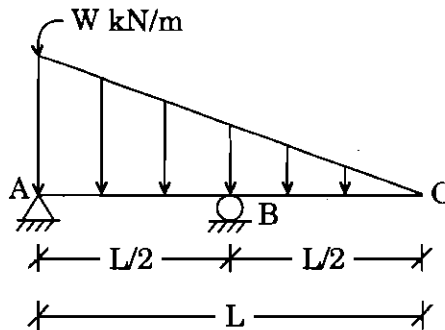
(1)  $-\frac{WL^3}{16}$

(2)  $-\frac{WL^2}{32}$

(3)  $-\frac{3WL^2}{32}$

(4)  $-\frac{3WL^2}{16}$

4. A beam ABC is supported and loaded as shown in the figure. Find the support reactions at A and B. (Neglect horizontal reaction at A)



(1)  $\frac{WL}{3}, \frac{WL}{3}$

(2)  $\frac{WL}{3}, \frac{WL}{6}$

(3)  $\frac{WL}{6}, \frac{WL}{3}$

(4)  $\frac{WL}{6}, \frac{WL}{6}$

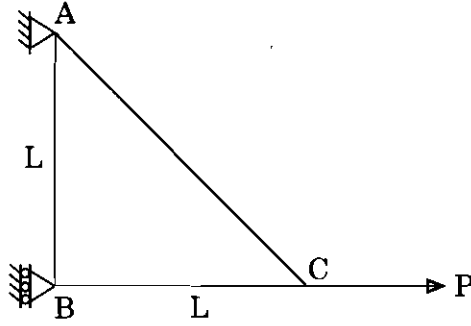
कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

A

5

Q10

5. A simple truss ABC is supported at A and B as shown in the figure. If a point load (P) along BC is applied at joint C in horizontal direction, then what will be the vertical deflection at C ? Assume same C/S area and same materials (i.e., A, E, I same for all members).

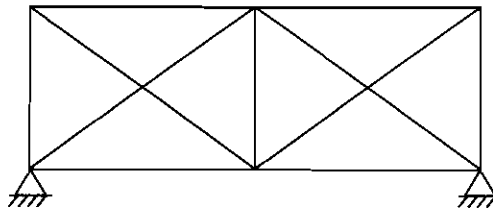


- (1)  $\frac{PL}{AE}$  ( $\uparrow$ )                      (2)  $\frac{2PL}{AE}$  ( $\downarrow$ )
- (3)  $\frac{PL}{AE}$  ( $\downarrow$ )                      (4)  $\frac{2PL}{3AE}$  ( $\downarrow$ )

6. In a fixed beam of span 'L' subjected to a central concentrated load 'W', the fixed end moment and moment at midspan are respectively

- (1)  $\frac{WL}{12}$  and  $\frac{WL}{6}$                       (2)  $\frac{WL}{8}$  and  $\frac{WL}{8}$
- (3)  $\frac{WL}{6}$  and  $\frac{WL}{12}$                       (4) None of the above

7. In the pin-jointed truss shown in the figure, the static degree of indeterminacy is



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

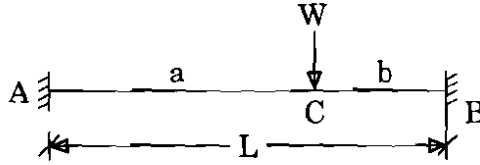


A

7

Q10

11. For both ends of the fixed beam shown in the figure carrying a concentrated load eccentrically placed on the beam, deflection under load is



(1)  $-\frac{W a^2 b^2}{3 EI L^2}$

(2)  $-\frac{W ab^2}{3 EI L}$

(3)  $-\frac{W a^3 b^3}{3 EI L^3}$

(4)  $-\frac{W a^3 b^2}{3 EI L^2}$

12. A continuous beam ABC is simply supported at supports A, B and C. Portion AB has span of 6 m and BC 4 m. Portion AB is loaded with a concentrated load of 120 kN downward at 3 m from A. The qualitative reactions shall be

- (1) Reactions at A and B shall be upward and reaction at C shall be zero  
(2) Reactions at A and B shall be upward and reaction at C shall be downward  
(3) All reactions i.e., at A, B and C shall be upwards  
(4) None of the above

13. A beam AB is simply supported and has flexural rigidity EI. The flexural strain energy of the beam having span 6 m and carrying a central point load of 10 kN is

(1) 142.38/EI

(2) 775/EI

(3) 225/EI

(4) None of the above

14. A given determinate truss is loaded with gravity loads. Under these loads different nodes undergo deflection horizontally and vertically. Thereafter the truss is subjected to a temperature drop of 50°C in the lower chord only. The coefficient of expansion or contraction  $\alpha = 11.7 \times 10^{-6}/^\circ\text{C}$ . Which of the following statements is true ?

- (1) Vertical and horizontal deflection along lower chord nodes remains the same.  
(2) Vertical and horizontal deflections along lower chord nodes shall change.  
(3) Horizontal deflection along lower chord nodes shall change but vertical deflection shall not change  
(4) None of the above

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

Q10

8

A

15. If the span and dip of a parabolic cable are  $L$  and  $h$  respectively, then the length of the cable is approximately equal to

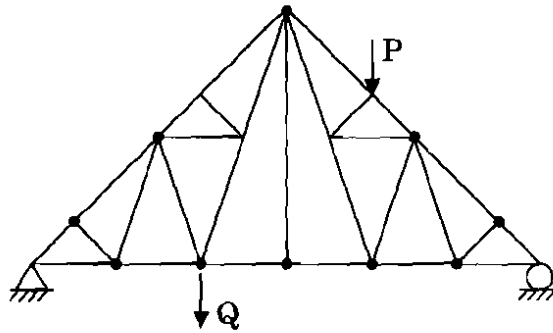
- (1)  $L + 3/8 h$  (2)  $L + 8/3 h$   
(3)  $L + 3/8 h^2/L$  (4)  $L + 8/3 h^2/L$

16. A three-hinged semicircular arch of radius  $R$  carries a uniformly distributed load  $W$  per unit run over the whole span.

The horizontal thrust is

- (1)  $R$  (2)  $\frac{WR}{2}$  (3)  $\frac{4}{3\pi} WR$  (4)  $\frac{2}{3\pi} WR$

17. For the plane truss shown in the figure, the number of zero force members for the given loading is



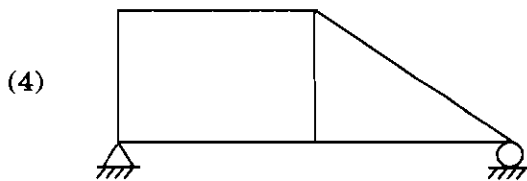
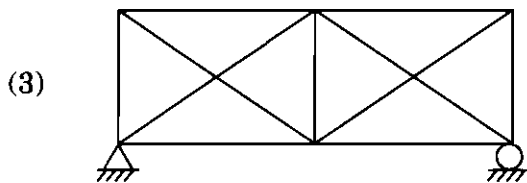
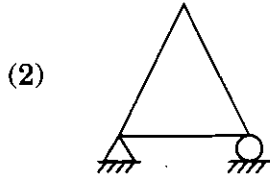
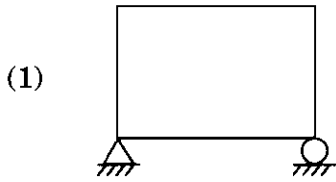
- (1) 4 (2) 8 (3) 11 (4) 13

18. A structure is said to be statically indeterminate when

- (1) the number of unknown reaction components exceeds the number of equilibrium conditions.  
(2) the number of equilibrium conditions exceeds the number of unknown reaction components.  
(3) the number of equilibrium conditions equal to the number of unknown reaction components.  
(4) None of the above

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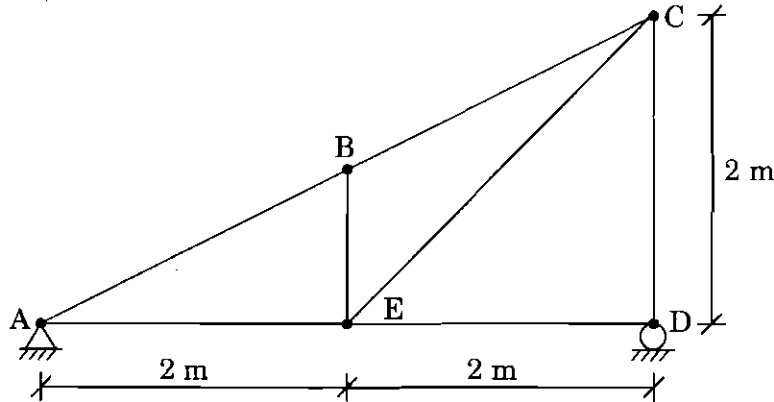
19. Which truss is the perfect truss out of the following ?



20. The flexibility method is also known as the

- |                         |                        |
|-------------------------|------------------------|
| (1) Energy method       | (2) Equilibrium method |
| (3) Displacement method | (4) Force method       |

21. The figure given below shows a pin-jointed frame :



What are the forces in members BE, CD and ED ?

- (1) 10 kN, 5 kN and 5 kN                      (2) 10 kN, 5 kN and Zero  
(3) 5 kN, 10 kN and Zero                      (4) 5 kN, 5 kN and Zero

22. A beam ABC is simply supported at A and B, BC is overhanging. Span AB = 8 m, BC = 2 m. Point 'D' is situated at 3 m from A. Using an influence line diagram or otherwise, find the maximum ordinates at 'D' of the influence line diagram for shear at 'D'.

- (1) - 0.375                      (2) - 0.625                      (3) + 0.625                      (4) + 1.875

23. For compression members with double angle section, unequal angles are preferred to equal angles because

- (1) they are easy for connection  
(2) they lead to large value of minimum radius of gyration  
(3) they have lesser effective length  
(4) of saving in gusset plate material

24. Minimum pitch for riveted connections should **not** be less than

- (1) 1.5 times the hole diameter  
(2) 2.5 times the hole diameter  
(3) 1.5 times the nominal diameter of rivet  
(4) 2.5 times the nominal diameter of rivet

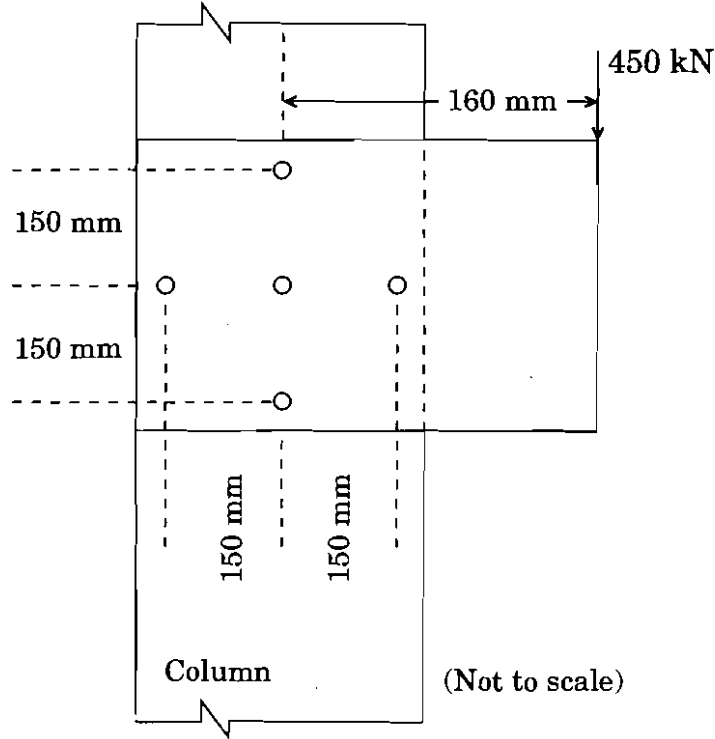
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25. The effective slenderness ratio of a battened column,  $\lambda_e$ , is taken as 1.10 times the actual slenderness ratio of the column to account for

- (1) Axial deformation (2) Bending deformation  
(3) Shear deformation (4) All of the above

26. The maximum design force for a rivet in the following bracket connection, if spacing between adjacent rivets is 150 mm, is



- (1) 150 kN (2) 175 kN  
(3) 200 kN (4) 212.5 kN

27. The minimum thickness of a base plate,  $t_s$  in case of slab base can be calculated by the formula

- (1)  $t_s = \sqrt{2.5w(b^2 - 0.3a^2)f_y / \gamma_{m_0}}$  (2)  $t_s = \sqrt{2.5w(b^2 - 0.3b^2)\gamma_{m_0} / f_y}$   
(3)  $t_s = \sqrt{2.5w(a^2 - 0.3b^2)\gamma_{m_0} / f_y}$  (4)  $t_s = \sqrt{2.5w(a^2 - 0.3a^2)f_y / \gamma_{m_0}}$

28. The top chord of a roof truss is inclined at an angle of  $20^\circ$ , no access is provided for maintenance. The live load to be considered for the design will be

- (1) Zero (2)  $0.4 \text{ kN/m}^2$   
(3)  $0.75 \text{ kN/m}^2$  (4)  $0.55 \text{ kN/m}^2$

29. If a structure is under fatigue stresses, then the welded joints as compared to riveted joints will fail

- (1) Earlier (2) Later  
(3) At the same time (4) Not at all

30. According to IS 800 : 2007, allowable vertical deflection for gantry girder with crane load (electronically operated up to 50 tons) is

- (1)  $\frac{\text{span}}{500}$  (2)  $\frac{\text{span}}{750}$   
(3)  $\frac{\text{span}}{1000}$  (4)  $\frac{\text{span}}{300}$

31. The design bending strength of a laterally supported beam is given by  $M_d = (\beta_b Z_p f_y) / \gamma_{m0}$ , where  $\beta_b$ ,  $Z_p$ ,  $f_y$  and  $\gamma_{m0}$  have their usual meaning.  $\beta_b$  for plastic and compact sections are given by

- (1) 1.0, 0.8 (2) 0.8, 1.0  
(3) 1,  $Z_e/Z_p$  (4) 1, 1

32. The deep structural members subjected to transverse loads are called

- (1) Beams (2) Columns  
(3) Plate girders (4) Trusses

33. The optimum thickness of web,  $t_w$ , of a plate girder is given by

- (1)  $t_w = \left( \frac{M_z}{f_y \cdot k^2} \right)^{0.33}$  (2)  $t_w = \left( \frac{f_y \cdot k^2}{M_z} \right)^{0.33}$   
(3)  $t_w = \left( \frac{M_z}{f_y \cdot k^2} \right)$  (4)  $t_w = \left( \frac{f_y \cdot k^2}{M_z} \right)$

A

13

Q10

34. In a singly reinforced balanced section, if M 30 concrete and Fe 415 steel is used, then the value of neutral axis factor ( $k_{u_{max}}$ ) in L.S.M. is

- (1) 0.42 (2) 0.46  
(3) 0.48 (4) 0.52

35. The maximum area of tension steel in a beam shall **not** exceed

- (1) 0.15 bD (2) 0.12 bD  
(3) 0.04 bD (4) 1.00 bD

36. Effective flange width of a continuous T-beam is

- (1)  $b_f = \frac{l_0}{6} + b_w + 6 D_f$  (2)  $b_f = \frac{l_0}{12} + b_w + 3 D_f$   
(3)  $b_f = \frac{l_0}{\frac{l_0}{b} + 4} + b_w$  (4)  $b_f = \frac{0.5 l_0}{\frac{l_0}{b} + 4} + b_w$

37. The maximum spacing of shear reinforcement measured along the axis of the member shall **not** exceed \_\_\_\_\_ for the vertical stirrups, where 'd' is the effective depth of the section.

- (1) 0.5 d (2) 0.7 d  
(3) 0.75 d (4) 0.65 d

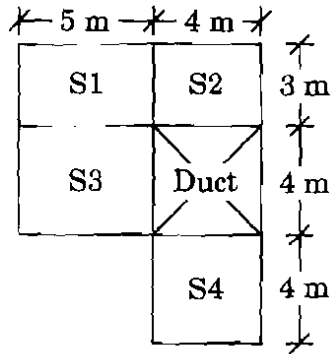
38. Determine the minimum and maximum longitudinal reinforcement for a square column of size 300 mm × 300 mm having a clear cover of 25 mm.

- (1) 500 mm<sup>2</sup> and 3750 mm<sup>2</sup>  
(2) 500 mm<sup>2</sup> and 5400 mm<sup>2</sup>  
(3) 720 mm<sup>2</sup> and 3750 mm<sup>2</sup>  
(4) 720 mm<sup>2</sup> and 5400 mm<sup>2</sup>

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P.T.O.

39. Match the end conditions for restrained slab panels :



- |       |                                       |
|-------|---------------------------------------|
| a. S1 | I. Four edges continuous              |
| b. S2 | II. One long edge continuous          |
| c. S3 | III. Two adjacent edges discontinuous |
| d. S4 | IV. Four edges discontinuous          |
|       | V. One short edge continuous          |

Select the correct response.

- |     | a   | b  | c  | d  |
|-----|-----|----|----|----|
| (1) | IV  | II | V  | I  |
| (2) | II  | V  | I  | IV |
| (3) | III | V  | II | IV |
| (4) | III | IV | II | V  |

40. For a simply supported beam of span 12 m, the basic value of span to effective depth ratio is

- (1) 20                      (2) 26                      (3) 65/3                      (4) 50/3

41. Match the conditions under which the given type of footing is used :

- |                     |   |
|---------------------|---|
| a. Combined footing | I. For two or more columns                  |
| b. Mat foundation   | II. For isolated or group of columns        |
| c. Pile foundation  | III. For individual column                  |
| d. Isolated footing | IV. For supporting all columns of structure |

Select the correct response.

- |     | a  | b   | c   | d   |
|-----|----|-----|-----|-----|
| (1) | II | III | IV  | I   |
| (2) | I  | IV  | II  | III |
| (3) | II | I   | III | IV  |
| (4) | II | IV  | I   | III |

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42. The height of a retaining wall is 5.5 m. It is to be designed as  
(1) Cantilever type (2) Counterfort type  
(3) Cantilever or counterfort type (4) None of the above
- 
43. A shear key is provided in a retaining wall to avoid  
(1) Sliding (2) Overturning  
(3) Buckling (4) Bending
- 
44. The imposed floor load acting on staircase for residential and educational buildings is to be considered as  
(1) 2.0 kN/m<sup>2</sup> and 3.0 kN/m<sup>2</sup> (2) 3.0 kN/m<sup>2</sup> and 2.0 kN/m<sup>2</sup>  
(3) 4.0 kN/m<sup>2</sup> and 3.0 kN/m<sup>2</sup> (4) 3.0 kN/m<sup>2</sup> and 4.0 kN/m<sup>2</sup>
- 
45. The extreme stress at the top and bottom edges of a prestressed beam when tendons are placed along the longitudinal axis of the beam are  
(1)  $\frac{P}{A} \pm \frac{M}{Z}$  (2)  $\frac{P}{Z} \pm \frac{M}{A}$   
(3)  $\frac{P}{A} \pm \frac{M}{I}$  (4)  $\frac{P}{I} \pm \frac{M}{A}$
- 
46. A simply supported rectangular prestressed concrete beam is subjected to uniformly distributed live load over its entire span, such that the resulting stress at the midspan at bottom fiber is zero. The eccentricity at that section is  $d/6$  below the C.G., where  $d$  is the depth of the beam. Location of the thrust line at that section is  
(1) At C.G. (2)  $d/6$  above C.G.  
(3)  $d/6$  below C.G. (4)  $d/3$  below C.G.
- 
47. A 4.8 m long post-tensioned prestressed concrete beam is prestressed by a parabolic cable with eccentricity of 15 mm above C.G. at both supports and 45 mm below C.G. at the midspan. The beam is tensioned from one end. In the estimation of maximum loss due to friction, what should be the cumulative angle turned by the parabolic profile ?  
(1) 0.01 radians (2) 0.1 radians  
(3) 0.15 radians (4) 0.02 radians

48. In a pre-tensioned prestressed concrete cross-section,

*Statement 1 :*

The stress in wires is assumed to be zero at the end supports and increases to its final maximum value over its transmission length.

*Statement 2 :*

The bond stress between concrete and prestressed wires is maximum near the end supports and decreases to nearly zero over its transmission length.

- (1) Statements 1 and 2 are true
- (2) Statement 1 is true and statement 2 is false
- (3) Statement 1 is false and statement 2 is true
- (4) Statements 1 and 2 are false

---

49. To avoid sudden collapse just after a shear crack, minimum shear reinforcement is provided in prestressed concrete member in the form of stirrups. IS 1343 suggested the relation as

(1)  $\frac{A_{sv}}{b \cdot s_v} = \frac{0.4 d}{0.87 f_y}$

(2)  $\frac{A_{sv}}{bd \cdot s_v} = \frac{0.4}{0.87} \times f_y$

(3)  $\frac{A_{sv}}{b \cdot s_v} = \frac{0.4}{0.87 f_y}$

(4)  $\frac{A_{sv}}{b \cdot s_v} = \frac{0.4 f_{ck}}{0.87 f_y}$

---

50. What is the maximum possible eccentricity in a prestressed concrete beam of circular cross-section ? Diameter of the section is d. Tension is not allowed anywhere and any time in the cross-section. Neglect dead load (self-weight).

- (1) d/8
- (2) d/6
- (3) d/4
- (4) d/3

---

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51. What will be the maximum possible uniformly distributed load (inclusive of self-weight) over the entire span of a simply supported beam of span 'L' such that the deflection at midspan at service condition is zero ? The cross-section is rectangular. The prestressing force 'P' is applied with uniform eccentricity 'e'. Assume no losses.

(1)  $\frac{8Pe}{L^2}$

(2)  $\frac{8.8Pe}{L^2}$

(3)  $\frac{9.6Pe}{L^2}$

(4)  $\frac{10.4Pe}{L^2}$

52. The loss due to creep in prestressed concrete shall be determined considering

- (1) All loads and prestressing force
- (2) Live loads and prestressing force
- (3) Permanent loads and prestressing force
- (4) Permanent loads only

53. The limit state of collapse for prestressed concrete is

- (1) Limit state of collapse : Deflection
- (2) Limit state of collapse : Cracking
- (3) Limit state of collapse : Maximum compression
- (4) None of the above

54. The designed prestressed concrete element should satisfy the limits specified for permissible stresses at transfer stage as well as service condition. The prestressing force 'P' and eccentricity 'e' evaluated from those limits are

- (1) Maximum value of 'P' and maximum value of 'e'
- (2) Maximum value of 'P' and minimum value of 'e'
- (3) Minimum value of 'P' and maximum value of 'e'
- (4) Minimum value of 'P' and minimum value of 'e'

55. During tensioning of prestressing tendons the breakage of wires in any one prestressed concrete member shall *not* exceed

- (1) 2.5%                      (2) 7.5%                      (3) 10%                      (4) 12.5%

56. Who is known as the Father of Scientific Management ?

- (1) Robert Owen
  - (2) Elton Mayo
  - (3) F.W. Taylor
  - (4) Henry Fayol
- 

57. ABC analysis is referred to as

- (1) Always Better Control analysis
  - (2) Alphabetical Backup Control analysis
  - (3) Analytical Boost Crane analysis
  - (4) None of the above
- 

58. A scaled drawing of the proposed construction site showing all the relevant features such as entry and exit points to the site, storage area for materials, toilets, workers quarters, etc. is called

- (1) Construction Plan
  - (2) Job Layout
  - (3) Development Plan
  - (4) Architectural Plan
- 

59. The event or events that immediately come before another event without any intervening events are called \_\_\_\_\_ events to that event.

- (1) Successor
  - (2) Dummy
  - (3) Predecessor
  - (4) Slack
- 

60. Which rule is used for numbering the events in a network, scientifically ?

- (1) Stevenson's rule
  - (2) Jackson's rule
  - (3) Fulkerson's rule
  - (4) Watson's rule
- 

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61. The cost inflow a firm receives if a machine still has value at the time of its disposal is known as
- (1) Salvage value
  - (2) Purchase expenses
  - (3) Operating cost
  - (4) Ownership cost
- 
62. Williams-Steiger Occupational Safety and Health Act (OSH Act) was passed in the year
- |          |          |
|----------|----------|
| (1) 1968 | (2) 1970 |
| (3) 1974 | (4) 1972 |
- 
63. Coefficient of traction for a crawler tractor is upto
- |         |         |
|---------|---------|
| (1) 0.9 | (2) 0.6 |
| (3) 1.2 | (4) 1.0 |
- 
64. Which of the following is a "Class-A" item in ABC analysis ?
- (1) Items with low cost but large in number
  - (2) Items with average cost but moderate in number
  - (3) Items with high cost but few in number
  - (4) Items with high cost but large in number
- 
65. Which of the following best defines "Negative Stock" ?
- (1) Project ahead of schedule
  - (2) Project on schedule
  - (3) Project behind schedule
  - (4) None of the above
- 
66. Quality circles in the construction industry can have the following participants :
- (1) Engineers and architects
  - (2) Contractors and raw material suppliers
  - (3) Clients and consultants
  - (4) All of the above

67. After solving the system

$$2x_1 + 4x_2 - 6x_3 = -8,$$

$$x_1 + 3x_2 + x_3 = 10, \text{ and}$$

$$2x_1 - 4x_2 - 2x_3 = -12$$

using Gauss-Jordan method, the values of  $x_1$ ,  $x_2$  and  $x_3$  are

(1) (1, 2, 3)

(2) (1, 3, 2)

(3) (3, 2, 1)

(4) (3, 1, 2)

68. The solution of the equations

$$5x_1 + x_2 + x_3 + x_4 = 4$$

$$x_1 + 7x_2 + x_3 + x_4 = 12$$

$$x_1 + x_2 + 6x_3 + x_4 = -5$$

$$x_1 + x_2 + x_3 + 4x_4 = -6$$

by Gauss-Jordan method is

(1) -1, -2, 1, 2

(2) -1, -2, -1, 2

(3) -1, 2, -1, 2

(4) 1, 2, -1, -2

69. To find the root of  $f(x) = 0$  by using the bisection method, an iteration is begun with the lower and upper guesses of the root. If  $x_{\text{lower}}$  and  $x_{\text{upper}}$  are the roots, then at the end of the iteration, the absolute relative approximate error in the estimated value of the root would be

(1)  $\left| \frac{x_{\text{upper}}}{x_{\text{upper}} + x_{\text{lower}}} \right|$

(2)  $\left| \frac{x_{\text{lower}}}{x_{\text{upper}} + x_{\text{lower}}} \right|$

(3)  $\left| \frac{x_{\text{upper}} - x_{\text{lower}}}{x_{\text{upper}} + x_{\text{lower}}} \right|$

(4)  $\left| \frac{x_{\text{upper}} + x_{\text{lower}}}{x_{\text{upper}} - x_{\text{lower}}} \right|$

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

70. With initial approximation of  $x_1 = x_2 = x_3 = 0$ , what is the next value of  $x_1$  in the following set of simultaneous equations ?

$$27x_1 + 6x_2 - x_3 = 81$$

$$6x_1 + 15x_2 + 2x_3 = 75$$

$$x_1 + x_2 + 50x_3 = 110$$

- (1) 2.25 (2) 3.0  
(3) 3.25 (4) 4.0

71. Match the following :

- |                                     |  |
|-------------------------------------|--|
| a. Newton-Raphson method            | I. $f(x)$ is a linear function of 'x'                  |
| b. Simpson's $1/3^{\text{rd}}$ rule | II. The number of intervals must be even               |
| c. Trapezoidal rule                 | III. Diagonal matrix                                   |
| d. Gauss Elimination                | IV. Solution of algebraic and transcendental equations |
| e. Gauss-Jordan method              | V. Forward elimination and Backward substitution       |

Select the correct response.

- |     | a   | b   | c   | d  | e   |
|-----|-----|-----|-----|----|-----|
| (1) | I   | II  | III | IV | V   |
| (2) | II  | III | I   | V  | IV  |
| (3) | III | I   | II  | V  | IV  |
| (4) | IV  | II  | I   | V  | III |

72. The procedure adopted in the Gauss-Jordan method in solving linear simultaneous equations is

- (1) It is required to assume initial approximate values of the variables.
  - (2) It reduces the given system of equations to a diagonal matrix.
  - (3) It reduces the given system of equations to an equivalent triangular system.
  - (4) The given matrix is factored into lower and upper triangular matrices.
- 

73. The solution by Gauss-Jordan method for the following equations

$$x + y + z = 9$$

$$2x - 3y + 4z = 13$$

$$3x + 4y + 5z = 40$$

is

- (1)  $x = 1, y = 2, z = 5$
  - (2)  $x = 1, y = 3, z = 5$
  - (3)  $x = 2, y = 1, z = 3$
  - (4)  $x = 1, y = 3, z = 2$
- 

74. The Newton-Raphson method is said to have

- (1) Linear convergence
  - (2) Superlinear convergence
  - (3) Quadratic convergence
  - (4) Oscillatory convergence
- 

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75. Back substitution is required in the following method(s) in the solution of linear simultaneous equations :

- (1) Gauss-Elimination method
- (2) Gauss-Jordan method
- (3) Iterative method
- (4) All of the above

76. The following data is given for the velocity of a body as a function of time. It is required to find the velocity at  $t = 21$  sec. For the purpose a quadratic polynomial  $v(t) = at^2 + bt + c$  is to be used. The velocity profile is given as

t in sec	0	13	14	15	18	20	22	24
v(t) in m/s	0	225	248.5	316.6	517.35	535.35	570	589.5

The correct set of equations that will find a, b and c is

$$(1) \begin{bmatrix} 169 & 13 & 1 \\ 225 & 15 & 1 \\ 324 & 18 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 248.5 \\ 316.6 \\ 517.35 \end{bmatrix} \quad (2) \begin{bmatrix} 176 & 14 & 1 \\ 225 & 15 & 1 \\ 400 & 20 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 248.5 \\ 316.6 \\ 535.35 \end{bmatrix}$$

$$(3) \begin{bmatrix} 169 & 13 & 1 \\ 196 & 14 & 1 \\ 225 & 15 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 225 \\ 248.5 \\ 316.6 \end{bmatrix} \quad (4) \begin{bmatrix} 324 & 18 & 1 \\ 484 & 22 & 1 \\ 225 & 15 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 517.35 \\ 589.50 \\ 316.6 \end{bmatrix}$$

77. During the determination of roots of equations  $x^2 + 2xy = 6$  and  $x^2 - y^2 = 3$  using the Newton-Raphson method, the value of Jacobian matrix 'D' is found to be

- (1) - 4
- (2) - 8
- (3) - 12
- (4) + 4

78. What is the minimum crushing strength of Granite used in India ?

- |                           |                           |
|---------------------------|---------------------------|
| (1) 200 N/mm <sup>2</sup> | (2) 100 N/mm <sup>2</sup> |
| (3) 50 N/mm <sup>2</sup>  | (4) 250 N/mm <sup>2</sup> |

79. Which of the following is *not* a test for measuring the workability of concrete ?

- |                         |                            |
|-------------------------|----------------------------|
| (1) Slump Test          | (2) Flow Test              |
| (3) Le Chatelier's Test | (4) Compaction Factor Test |

80. Which of the following is a field test for measuring the consistency of plastic concrete ?

- |                           |                            |
|---------------------------|----------------------------|
| (1) Le Chatelier's Test   | (2) Compaction Factor Test |
| (3) Elongation Index Test | (4) Kelly Ball Test        |

81. In which type of bond is cavity existing ?

- |                   |                    |
|-------------------|--------------------|
| (1) Flemish bond  | (2) English bond   |
| (3) Rat-trap bond | (4) Stretcher bond |

82. Which of the following is a method of mechanical ventilation ?

- |                        |                                |
|------------------------|--------------------------------|
| (1) Plenum System      | (2) Bleeding System            |
| (3) Segregation System | (4) Natural Ventilation System |

83. Gypsum is added to Portland cement during its manufacturing so that it may

- (1) Accelerate the setting time
- (2) Retard the setting time
- (3) Decrease the burning temperature
- (4) Facilitate grinding

84. Principles of planning for buildings include

- |                        |                            |
|------------------------|----------------------------|
| a. Aspect and Prospect | b. Roominess               |
| c. Grouping            | d. Flexibility and Privacy |

**Answer options :**

- |                  |                   |
|------------------|-------------------|
| (1) a and b only | (2) b and d only  |
| (3) a and c only | (4) a, b, c and d |

करच्या कामासाठी जागा / SPACE FOR ROUGH WORK

85. Timber can be made reasonably fire-resistant by

- (1) Soaking it in Ammoniam Sulphate
- (2) Coating it with Tar paint
- (3) Pumping creosote oil into timber under high pressure
- (4) Seasoning process

---

86. Which of the following is **not** a non-destructive test ?

- (1) Rebound Hammer Test
- (2) Surface Hardness Test
- (3) Ultrasonic Pulse Velocity Test
- (4) Soundness Test

---

87. Which is the major constituent of ordinary Portland cement ?

- (1) CaO
- (2) MgO
- (3) SO<sub>3</sub>
- (4) Fe<sub>2</sub>O<sub>3</sub>

---

88. Which is an example of cased cast-in-situ concrete pile ?

- (1) Raymond pile
- (2) Watson pile
- (3) Reynold pile
- (4) Boston pile

---

89. As per building bye-laws, for fixing up the height of a building, which rule is generally used ?

- (1)  $63\frac{1}{2}^\circ$  Rule
- (2)  $37\frac{2}{3}^\circ$  Rule
- (3)  $65\frac{1}{2}^\circ$  Rule
- (4)  $45^\circ$  Rule

---

90. The stress developed due to external force in an elastic material

- (1) Depends on elastic constant
- (2) Does not depend on elastic constant
- (3) Depends partially on elastic constant
- (4) Depends on limit of proportionality

91. The Modulus of Elasticity in terms of Bulk Modulus and Modulus of Rigidity is

- (1)  $\frac{9KG}{3K + G}$       (2)  $\frac{9KG}{K + 3G}$       (3)  $\frac{3K + G}{9KG}$       (4)  $\frac{K + 3G}{9KG}$
- 

92. In case of biaxial stresses, the maximum value of shear stress is

- (1) Difference of normal stresses  
(2) Half the difference of normal stresses  
(3) Sum of normal stresses  
(4) Half the sum of normal stresses
- 

93. If a solid circular shaft is simultaneously subjected to a torque 'T' and a bending moment 'M', the ratio of maximum bending stress and maximum torsional shearing stress is given by

- (1)  $M/T$       (2)  $T/M$   
(3)  $2M/T$       (4)  $2T/M$
- 

94. The slenderness ratio of a vertical column of square cross-section of 2.5 cm sides and 300 cm effective length, is

- (1) 200      (2) 360  
(3) 240      (4) 416
- 

95. Columns of given length, cross-section and material have different values of buckling loads for different end conditions. The strongest column is one whose

- (1) one end is fixed and the other end is hinged  
(2) both the ends are hinged or pin-jointed  
(3) one end is fixed and the other entirely free  
(4) both the ends are fixed
- 

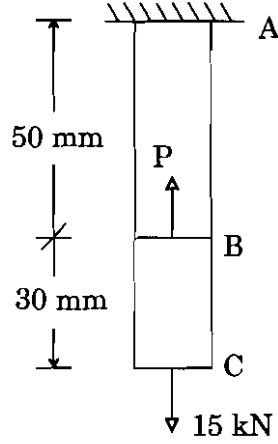
96. A circular shaft was initially subjected to bending moment and then was subjected to torsion. If the magnitude of bending moment is found to be the same as that of the torque, then the ratio of maximum bending stress to shear stress would be

- (1) 0.25      (2) 0.50  
(3) 2.0      (4) 4.0
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



97. A steel bar ABC of uniform cross-section  $100 \text{ mm}^2$  is suspended vertically and loaded as shown in the figure. If the lower end of bar C does not move when loads are applied (neglect self-weight), then the value of force P is ( $E_s = 200 \text{ kN/mm}^2$ )



- (1) 24 kN                      (2) 42 kN                      (3) 36 kN                      (4) 15 kN
- 
98. Principal stresses at a point in a plane stressed element are  $\sigma_x = \sigma_y = 500 \text{ N/mm}^2$ . Normal stress on the plane inclined at  $45^\circ$  to the x-axis will be
- (1) Zero    (2)  $500 \text{ N/mm}^2$   
(3)  $1000 \text{ N/mm}^2$     (4)  $707 \text{ N/mm}^2$
- 
99. The Euler's crippling load for a 2 m long slender steel rod of uniform cross-section hinged at both the ends is 1 kN. The Euler's crippling load for a 1 m long steel rod of the same cross-section and hinged at both the ends will be
- (1) 0.25 kN    (2) 0.5 kN  
(3) 2 kN    (4) 4 kN
- 
100. A solid shaft of diameter 'D' carries a twisting moment that develops maximum shear stress. If the shaft is replaced by a hollow one of outside diameter 'D' and inside diameter  $\frac{D}{2}$ , then the maximum shear stress will be
- (1)  $1.067 \tau$     (2)  $1.143 \tau$   
(3)  $1.33 \tau$     (4)  $2 \tau$

## सूचना - (पृष्ठ 1 वरून पुढे.....)

- (8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या “परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82” यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.
- (9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वतःबरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.

## नमुना प्रश्न

Pick out the correct word to fill in the blank :

Q. No. 201. I congratulate you \_\_\_\_\_ your grand success.

- (1) for (2) at  
(3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर “(3) on” असे आहे. त्यामुळे या प्रश्नाचे उत्तर “(3)” होईल. यास्तव खालीलप्रमाणे प्रश्न क्र. 201 समोरील उत्तर-क्रमांक “(3)” हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. 201.

- ① ② ● ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगातर्फे घेण्यात आलेल्या महाराष्ट्र अभियांत्रिकी सेवा (स्थापत्य) (मुख्य) परीक्षा- 2017 या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ज्ञांचे अभिप्राय विचारात घेऊन आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

उत्तरतालिका - KEY

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
1	3	3	3	1
2	4	3	1	4
3	#	1	2	3
4	3	3	3	2
5	1	4	3	4
6	2	3	1	2
7	3	4	2	2
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19	2	3	3	1
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21	#	3	3	1
22	3	1	3	1
23	2	3	2	1
24	4	1	3	2
25	3	2	4	1

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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27	3	3	1	3
28	4	1	2	4
29	2	2	4	4
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31	4	3	4	1
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37	3	2	2	#
38	4	4	3	3
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44	4	3	4	2
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47	2	4	4	3
48	1	3	#	2
49	3	1	3	4
50	1	2	1	2

प्रश्नपत्रिका क्र.१ (स्थापत्य अभियांत्रिकी पेपर - I)

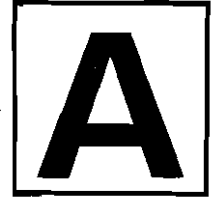
प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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52	3	1	3	1
53	4	4	1	2
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55	1	1	2	#
56	3	1	3	3
57	1	2	2	2
58	2	1	3	4
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60	3	3	4	1
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63	1	3	1	2
64	3	1	2	2
65	3	2	4	4
66	4	4	#	3
67	1	1	3	1
68	4	3	2	3
69	3	4	4	3
70	2	#	3	1
71	4	3	1	3
72	2	1	3	4
73	2	2	4	3
74	3	3	2	4
75	1	1	2	2

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
76	3	3	4	1
77	3	2	3	1
78	2	3	1	4
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85	1	1	4	3
86	4	2	2	3
87	1	4	1	4
88	1	#	1	3
89	1	3	4	1
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93	3	1	1	3
94	4	3	3	3
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96	3	2	3	2
97	1	2	3	1
98	2	4	4	3
99	4	3	3	3
100	1	1	1	4

Date : 28<sup>th</sup> March, 2018

2

# ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.



R10

स्थापत्य अभियांत्रिकी पेपर - २

एकूण प्रश्न : १००

एकूण गुण : २००

वेळ : २ (दोन) तास

### सूचना

- (1) सदर प्रश्नपुस्तिकेत १०० अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.
- (2) आपला परीक्षा-क्रमांक ह्या चौकोनांत न विसरता बॉलपेनने लिहावा.
- (3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे न विसरता नमूद करावा.
- (4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला ४ पर्यायी उत्तरे सुचविली असून त्यांना १, २, ३ आणि ४ असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर छायांकित करून दर्शविला जाईल याची काळजी घ्यावी. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.
- (5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नांकडे वळावे. अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.
- (6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.
- (7) प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवारांच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".

### ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-८२" यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

**पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा**

पर्यवेक्षकांच्या सूचनेखिना हे सील उघडू नये

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

1. The dimensions of dynamic viscosity are

- (1)  $L^2/T$  (2)  $M/LT$   
(3)  $MT/L$  (4)  $T/L^2$

2. If the velocity potential function  $\phi = 5(x^2 - y^2)$ , the velocity components at the points (4, 5) will be

- (1)  $u = -35, v = 40$   
(2)  $u = -40, v = 55$   
(3)  $u = -40, v = 50$   
(4)  $u = 40, v = -50$

3. Printer's ink is an example of

- (1) Newtonian fluid  
(2) Non-Newtonian fluid  
(3) Thixotropic substance  
(4) Elastic solid

4. Dynamic Viscosity of a gas

- (1) Increases as temperature decreases  
(2) Increases as temperature increases  
(3) Is independent of temperature  
(4) May increase or decrease with increase in temperature, depending on the nature of gas

5. According to Froude's model law

- (1)  $\frac{V_p \times L_p}{v_p} = \frac{V_m \times L_m}{v_m}$  (2)  $\frac{V_m}{\sqrt{g_m L_m}} = \frac{V_p}{\sqrt{g_p L_p}}$   
(3)  $\frac{V_m}{\sqrt{\rho_m}} = \frac{V_p}{\sqrt{\rho_p}}$  (4)  $\frac{V_m}{\sqrt{\sigma_m / \rho_m L_m}} = \frac{V_p}{\sqrt{\sigma_p / \rho_p L_p}}$

6. For a hydrostatic pressure measurement in fluids at rest,

- (1) The shear stress depends upon the coefficient of viscosity
  - (2) The shear stress is maximum on a plane inclined  $45^\circ$  to horizontal
  - (3) The shear stress is zero
  - (4) The shear stress is zero only on horizontal plane
- 

7. If in a flow field  $\frac{P}{\gamma} + \frac{v^2}{2g} + z = \text{constant}$  between any two points, flow must be

- (1) Steady, compressible and irrotational
  - (2) Unsteady, incompressible and irrotational
  - (3) Steady, incompressible and irrotational
  - (4) Steady, compressible and along a stream line
- 

8. For a centrifugal pump, suction lift head is the

- (1) Vertical distance between the top surface of liquid level in the discharge tank and pump centre line
  - (2) Vertical distance between free surface of liquid level in the sump and pump centre line
  - (3) Head for overcoming friction loss in the suction pipe, entry loss at entrance to the friction pipe and running fluid in the suction pipe
  - (4) None of the above
- 

9. The centre of buoyancy of a submerged body

- (1) Coincides with the centre of gravity of the body
  - (2) Coincides with the centroid of the displaced volume of the fluid
  - (3) Is always below the centre of gravity of the body
  - (4) Is always above the centroid of the displaced volume of the liquid
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



10. What is the range of the speed ratio for a Francis Turbine ?

- (1) 0.10 to 0.30 (2) 0.60 to 0.90  
(3) 0.85 to 0.90 (4) 1.40 to 2.25

11. For high head, the suitable turbine is

- (1) Pelton (2) Francis  
(3) Kaplan (4) None of the above

12. The discharge through a single-acting reciprocating pump is

- (1)  $Q = \frac{ALN}{60}$  (2)  $Q = \frac{2 ALN}{60}$   
(3)  $Q = ALN$  (4)  $Q = 2 ALN$

13. The specific speed ( $N_s$ ) of a pump is given by the expression

- (1)  $N_s = \frac{N\sqrt{Q}}{H_m^{5/4}}$  (2)  $N_s = \frac{N\sqrt{P}}{H_m^{3/4}}$   
(3)  $N_s = \frac{N\sqrt{Q}}{H_m^{3/4}}$  (4)  $N_s = \frac{N\sqrt{P}}{H_m^{5/4}}$

14. Jet ratio (m) is defined as the ratio of

- (1) Diameter of the jet of water to diameter of the Pelton wheel  
(2) Velocity of vane to velocity of the jet of water  
(3) Velocity of flow to velocity of the jet of water  
(4) Diameter of Pelton wheel to diameter of the jet of water

15. A graph between the pressure head in the cylinder and the distance travelled by the piston from inner dead centre for one complete revolution of crank is known as

- (1) Slip diagram
  - (2) Crank diagram
  - (3) Polar diagram
  - (4) Indicator diagram
- 

16. A turbine is called impulse if at the inlet of the turbine

- (1) Total energy is only kinetic energy
  - (2) Total energy is only pressure energy
  - (3) Total energy is the sum of kinetic energy and pressure energy
  - (4) None of the above
- 

17. Which of the following statements is correct ?

- (1) Curves at constant speed are called main characteristics curves.
  - (2) Curves at constant head are called main characteristic curves.
  - (3) Curves at constant efficiency are called operating characteristic curves.
  - (4) Curves at constant efficiency are called main characteristic curves.
- 

18. The manometer head ( $H_m$ ) of a centrifugal pump is given by

- (1) Pressure head at outlet of pump – pressure head at inlet
  - (2) Total head at inlet – total head at outlet
  - (3) Total head at outlet – total head at inlet
  - (4) None of the above
-

19. The Goodrich method is used for
- (1) Determining reservoir capacity
  - (2) Flood routing
  - (3) Reservoir sediment evaluation
  - (4) Trap efficiency
- 
20. The extent by which the inflow hydrograph gets modified due to the reservoir storage can be computed by a process known as
- (1) River routing
  - (2) Channel routing
  - (3) S hydrograph
  - (4) Flood routing or reservoir routing
- 
21. A permeable stratum which is capable of yielding appreciable quantities of groundwater under gravity is known a/an
- (1) Well
  - (2) Artesian well
  - (3) Aquifer
  - (4) Aquiclude
- 
22. In routing a flood through a reach, the point of intersection of inflow and outflow hydrographs coincides with the peak of outflow hydrograph
- (1) In all cases of flood routing
  - (2) In channel routing only
  - (3) In all cases of reservoir routing
  - (4) When the inflow is into a reservoir with an uncontrolled outlet
- 
23. The volume of groundwater extracted by gravity drainage from a saturated water bearing material is known as
- (1) Field capacity
  - (2) Specific retention
  - (3) Specific capacity
  - (4) Yield
- 
24. The distance from the centre of a pumped well to the point, where the drawdown is zero or is inappreciable, is known as
- (1) Drawdown
  - (2) Cone of pressure
  - (3) Radius of influence
  - (4) Piezometric surface

25. The well yield per unit drawdown is known as

- (1) Specific capacity of a well                      (2) Efficiency of a well  
(3) Retention of a well                              (4) Well loss
- 

26. If within a zone of saturation, an impervious deposit below a pervious deposit is found to support a body of saturated material, then this body of saturated material is known as

- (1) Flowing well                                      (2) Aquiclude  
(3) Artesian aquifer                                (4) Perched aquifer
- 

27. If  $S_y$  = Specific yield and  $S_r$  = Specific retention, then

- (1)  $S_y + S_r = 0.50$                               (2)  $S_y + S_r = \text{Porosity}$   
(3)  $S_y + S_r = 1.0$                               (4)  $S_y + S_r = \text{Permeability}$
- 

28. \_\_\_\_\_ is an example of a non-rigid dam.

- (1) Arch dam                                        (2) Timber dam  
(3) Steel dam                                        (4) Rockfill dam
- 

29. 'Bank storage' in a dam reservoir

- (1) Decreases the computed reservoir capacity  
(2) Increases the computed reservoir capacity  
(3) Sometimes decreases and sometimes increases the computed reservoir capacity  
(4) Has no effect on reservoir capacity
- 

30. In case of gravity dams, the factor of safety against over turning should not be less than

- (1) 1.00                      (2) 1.10                      (3) 1.25                      (4) 1.50
- 

31. Sharper crest of an ogee spillway

- (1) Increases the value of coefficient of discharge  
(2) Decreases the effective head  
(3) Increases stability of crest due to hydrostatic pressure  
(4) Has no effect on any one of the above
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

32. A land is known as waterlogged when
- (1) Gravity drainage has ceased
  - (2) Permanent wilting point is reached
  - (3) The soil becomes completely saturated
  - (4) Capillary fringe reaches the root zone of the plants
- 
33. Seepage failure of earth-filled dam is due to
- (1) Toe erosion
  - (2) Wave erosion
  - (3) Gullying
  - (4) Sloughing
- 
34. Auxiliary devices in stilling basins are provided
- (1) To stabilise the flow
  - (2) To reduce the length of the basin
  - (3) As additional measure to control jump
  - (4) All of the above
- 
35. Which of the following structures is constructed to separate under sluices from the main weir ?
- (1) Marginal bund
  - (2) Divide wall
  - (3) Head regulator
  - (4) None of the above
- 
36. The crest of an emergency spillway is placed
- (1) Below the designed minimum reservoir water level
  - (2) At the designed minimum reservoir water level
  - (3) At or above the designed minimum reservoir water level
  - (4) None of the above
- 
37. The road length of National Highway by Third Road Plan Formulae, in a certain district in India having its area as 13,400 sq.m will be
- (1) 134 km
  - (2) 268 km
  - (3) 402 km
  - (4) 1340 km
- 
38. For the purpose of measuring the stopping sight distance, IRC had suggested the height of eye level of driver and the height of the object above the road surface as
- (1) 1.5 m and 0.15 m
  - (2) 1.2 m and 0.12 m
  - (3) 1.2 m and 0.15 m
  - (4) 1.5 m and 0.12 m

39. A vertical summit curve is formed at the intersection of two gradients, + 5% and – 5%. The length of summit curve needed to provide a stopping sight distance of 100 m will be

- (1) 227 m                      (2) 0 m                      (3) 327 m                      (4) 197 m

40. The maximum utility system is based on the concept of

- (1) Maximum utility per unit cost of road  
(2) Maximum utility per unit length of road  
(3) Maximum utility per unit population  
(4) None of the above

41. Match the following :

- |                           |   |
|---------------------------|---|
| a. Primary survey         | I. Collect general characteristics of an area         |
| b. Map study              | II. Improvement in horizontal and vertical alignments |
| c. Realignment of highway | III. Collect physical information                     |
| d. Reconnaissance         | IV. Alignment avoiding valleys, ponds or lakes        |

- |     | a   | b  | c  | d   |
|-----|-----|----|----|-----|
| (1) | I   | IV | II | III |
| (2) | III | II | IV | I   |
| (3) | I   | II | IV | III |
| (4) | III | IV | II | I   |

42. Determine the safe stopping sight distance for design speed of 14 m/s for two-way traffic on a two lane road assuming the coefficient of friction as 0.28 and a reaction time of 2 seconds.

- (1) 63.67 m                      (2) 61.47 m                      (3) 53.27 m                      (4) 73.57 m

43. As per the modified classification of road system by the Third Road Development Plan, 1981 – 2001, the roads in the country under 'Primary System' of road network consist of

- (1) Expressways and National Highways  
(2) State Highways (SH) and Major District Roads (MDR)  
(3) Other District Roads (ODR) and Village Roads (VR)  
(4) All of the above

44. The Benkelman Beam Deflection method is used for
- (1) Flexible overlay on flexible pavement
  - (2) Rigid overlay on rigid pavement
  - (3) Flexible overlay on rigid pavement
  - (4) Rigid overlay on flexible pavement
- 
45. The width of carriageway for various classes of roads standardised by the Indian Road Congress (IRC) for two lanes without raised kerbs is
- (1) 3.75 m
  - (2) 7.00 m
  - (3) 7.50 m
  - (4) 5.50 m
- 
46. The strength of a bridge is termed as MBG loading of 1987. MBG refers to
- (1) Model Broad Gauge
  - (2) Modified Broad Gauge
  - (3) Modified Budget Grant
  - (4) Main Broad Gauge
- 
47. The centrifugal force is assumed to act at a height of \_\_\_\_\_ above the level of the carriageway of the bridge.
- |           |            |
|-----------|------------|
| (1) 1 m   | (2) 1.2 m  |
| (3) 1.5 m | (4) 1.75 m |
- 
48. For all parts of bridge floors accessible only to pedestrains and for all footways, loading should be
- |                           |                           |
|---------------------------|---------------------------|
| (1) 200 kg/m <sup>2</sup> | (2) 300 kg/m <sup>2</sup> |
| (3) 400 kg/m <sup>2</sup> | (4) 500 kg/m <sup>2</sup> |

49. \_\_\_\_\_ loading is adopted on all roads on which permanent bridges and culverts are constructed.

- (1) IRC Class A
- (2) IRC Class AA
- (3) IRC Class B
- (4) IRC Class AB

---

50. According to the criteria recommended by IRC for Girder Bridges, the limiting load should not cause a deflection more than \_\_\_\_\_ of the span.

- (1) 1/1000
- (2) 1/1200
- (3) 1/1500
- (4) 1/2000

---

51. The centre-to-centre distance between any two adjacent supports is called the \_\_\_\_\_ of a bridge.

- (1) span
- (2) clear span
- (3) nominal span
- (4) effective span

---

52. The scour velocity of the stream is the

- (1) Average velocity
- (2) Maximum velocity at any time during the year
- (3) Velocity which can move the particles of bed materials
- (4) Velocity at which a highway bridge is liable to be damaged

---

53. The bridge structure having a gross length of 6 m or less between the faces of the abatement or extreme vintage boundaries is known as

- (1) Causeway
- (2) Culvert
- (3) Short span bridge
- (4) None of the above

---

54. In case of navigable rivers, the minimum free board provided is usually

- (1) 30 cm to 45 cm
- (2) 1.2 m to 1.5 m
- (3) 2.4 m to 3.0 m
- (4) 1.0 m

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कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK



55. NATM method of tunnelling is suitable for
- Subway construction
  - Abnormal geological conditions
  - Soils at medium of shallow depth
  - Tunnelling large sections in very difficult ground

**Answer options :**

- |                     |                   |
|---------------------|-------------------|
| (1) a and b only    | (2) b and d only  |
| (3) a, c and d only | (4) a, b, c and d |

- 
56. Which one of the following shapes is suitable for the construction of tunnel in non-cohesive soils ?

- |                 |                |
|-----------------|----------------|
| (1) Rectangular | (2) Horse-shoe |
| (3) Egg-shaped  | (4) Circular   |

- 
57. The tunnels that are made to shortcut minor local obstacles are called

- |                      |                    |
|----------------------|--------------------|
| (1) Spiral tunnels   | (2) Short tunnels  |
| (3) Off-spur tunnels | (4) Saddle tunnels |

- 
58. Which among the following is **not** a part of shield equipment ?

- |                 |                  |
|-----------------|------------------|
| (1) Gravel tank | (2) Trailing dam |
| (3) Nipper car  | (4) Chute        |

- 
59. The following operations are generally employed for the Needle Beam Method of tunnelling :

- A trench jack is placed on the centre line of the needle beam to support the segment.
- A monkey drift is driven for a short distance.
- Drift is widened sideways and supported by lagging segments.
- The roof of the monkey drift is supported by lagging.
- The needle beam is slowly skidded forward into the monkey drift.

The correct sequence of operations is

- |                       |                       |
|-----------------------|-----------------------|
| (1) c - d - e - a - b | (2) a - b - c - d - e |
| (3) b - d - e - a - c | (4) b - a - e - d - c |

60. Which of the following is a serious health issue in case of workers involved in tunnelling operations ?

- (1) Pneumonia (2) Deafness  
(3) Silicosis (4) Jaundice

61. The amount of fresh air required to maintain ventilation for workers inside the tunnel should be

- (1) 1 – 5 m<sup>3</sup>/minute  
(2) 6 – 14 m<sup>3</sup>/minute  
(3) 20 – 30 m<sup>3</sup>/minute  
(4) 30 – 50 m<sup>3</sup>/minute

62. The method used to control the amount of dust, where use of water while drilling may be impracticable or undesirable is

- (1) Dry system  
(2) Vacuum hood system  
(3) Control system  
(4) Absorption system

63. In compressed air tunnelling, the amount of air required per minute per m<sup>2</sup> of face area is

- (1) 1 m<sup>3</sup>/min/m<sup>2</sup> (2) 6 m<sup>3</sup>/min/m<sup>2</sup>  
(3) 10 m<sup>3</sup>/min/m<sup>2</sup> (4) 20 m<sup>3</sup>/min/m<sup>2</sup>

64. The correct pair showing percentage of total solids in cow-dung and night soil is

- |     | <i>Cow-dung</i> | <i>Night Soil</i> |
|-----|-----------------|-------------------|
| (1) | 1.4 – 1.8%      | 3 – 5%            |
| (2) | 1.0 – 2%        | 2.5 – 4.5%        |
| (3) | 18 – 25%        | 11 – 15%          |
| (4) | 70 – 80%        | 82 – 88%          |

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65. Which of the following pairs is **not** correctly matched ?

- (1) Dead end system – Hardy-Cross method
- (2) Residual pressure at ferrule point in rural area – 5 m
- (3) Distribution reservoir – Central location
- (4) Gridiron system – More number of valves

---

66. Consider the following statements pertaining to the sources of supply :

- a. Groundwater has low organic content and high dissolved oxygen.
- b. Lake water at the bottom has silt and bacteria.
- c. River water in floods has low dissolved oxygen and colour.

Which of the above statements is/are correct ?

- (1) a only
- (2) b only
- (3) c only
- (4) a, b and c

---

67. As per I.S. 10500, acceptable limit for chlorides in mg/l in drinking water is

- |              |               |
|--------------|---------------|
| (1) 100 mg/l | (2) 250 mg/l  |
| (3) 500 mg/l | (4) 1500 mg/l |

---

68. Activated sludge process is an

- (1) Aerobic attached growth system
- (2) Anaerobic attached growth system
- (3) Anaerobic suspended growth system
- (4) Aerobic suspended system

69. If B.O.D. of waste water sample after 5 days incubation at 20°C is 100 mg/l, deoxygenation rate constant at 20°C is 0.1 per day, ultimate B.O.D. will be

- (1) 120.20 mg/l
  - (2) 146.25 mg/l
  - (3) 200.45 mg/l
  - (4) 225.60 mg/l
- 

70. Which one of the following is the purpose of providing surge tank in pipelines carrying water ?

- (1) To store water
  - (2) To increase pressure in the pipeline
  - (3) To store overflowing water
  - (4) To protect the pipeline against water hammer
- 

71. In the activated sludge process, sludge volume index is used to decide

- (1) Quality of raw sewage
  - (2) Quality of final effluent
  - (3) Recirculation ration of sludge
  - (4) Rate of aeration
- 

72. An appurtenance used to connect high level branch sewer to low level branch sewer is

- (1) Mahhole
  - (2) Drop manhole
  - (3) Inverted siphon
  - (4) Catch basin
- 

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

73. The maximum tolerances in overall length of a 20 m and 30 m metric chain should be respectively

- (1)  $\pm 2$  mm,  $\pm 8$  mm
  - (2)  $\pm 3$  mm,  $\pm 5$  mm
  - (3)  $\pm 5$  mm,  $\pm 8$  mm
  - (4)  $\pm 8$  mm,  $\pm 5$  mm
- 

74. Closed contour lines with one or more higher value contours inside it represent

- (1) A hill
  - (2) A depression
  - (3) A cliff
  - (4) A valley
- 

75. The lines joining points of equal dip are called

- (1) Aclinic lines
  - (2) Isogonic lines
  - (3) Agonic lines
  - (4) Isoclinic lines
- 

76. The magnetic bearing of the sun at noon is  $178^\circ$ . The magnetic declination at the place is

- (1)  $2^\circ$  W
  - (2)  $2^\circ$  E
  - (3)  $2^\circ$  N
  - (4)  $2^\circ$  S
- 

77. If the lower clamp is tightened and the upper clamp is loosened, the theodolite may be turned

- (1) With a relative motion between vernier and graduated scales of the lower plate
  - (2) Without a relative motion between vernier and graduated scales of the lower plate
  - (3) Both (1) and (2)
  - (4) About the horizontal axis
- 

78. Total station is used for

- (1) Remote object height determination
  - (2) Establishing horizontal control
  - (3) Establishing vertical control
  - (4) All of the above
-

79. Sensitivity of a level tube increases with
- An increase in radius of curvature of the bubble tube.
  - Smoothness of finish of the inner surface of the bubble tube.

**Answer options :**

- (1) Only a is correct (2) Only b is correct  
(3) Both are correct (4) None is correct

80. If the intercept on a vertical staff is observed as 0.75 m from a tacheometer with the line of sight horizontal, fitted with anallatic lens, the horizontal distance between the tacheometer and the staff station is

- (1) 0.75 m (2) 7.5 m (3) 75 m (4) 750 m

81. Froude's transition curve is

- (1) Cubic spiral (2) Cubic parabola  
(3) Bernoulli's lemniscate (4) Ellipse

82. A triangulation station selected close to the main station for avoiding intervening obstruction is called

- (1) Tie station (2) Eccentric station  
(3) Pivot station (4) Satellite station

83. An owner of a building requires ₹ 15,000 to repair his building after 5 years. What sum should the owner have to invest now in order to receive the required amount of money at a rate of compound interest 8% ?

- (1) ₹ 10,207.50 (2) ₹ 10,720.50  
(3) ₹ 10,270.50 (4) ₹ 10,072.50

84. While writing specifications, the following principles shall be adopted :

- Description of materials
- Workmanship, tools and plants
- Protection of new work
- Clauses of the specifications
- Expression

**Answer options :**

- (1) a, b and e (2) a, b, c, d and e  
(3) b and e (4) a, d and e

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85. Purposes of rate analysis are

- a. To determine the current rate per unit of an item at the locality
- b. To examine the viability of rates offered by contractors
- c. To calculate the quantity of materials and labour strength required for project planning
- d. To fix labour contract rates

**Answer options :**

- |                |                    |
|----------------|--------------------|
| (1) a, b and d | (2) b, c and d     |
| (3) a, b and c | (4) a, b, c, and d |

---

86. The usual practice of bending of a bar near a support is at an angle of

- |         |         |         |         |
|---------|---------|---------|---------|
| (1) 30° | (2) 45° | (3) 60° | (4) 15° |
|---------|---------|---------|---------|

---

87. For painting corrugated steel sheet, surfaces shall be measured flat and the area worked out shall be increased by

- |         |         |         |         |
|---------|---------|---------|---------|
| (1) 10% | (2) 12% | (3) 14% | (4) 20% |
|---------|---------|---------|---------|

---

88. Which of the following specifications are *not* correct with reference to a brickwork ?

- a. Brickwork shall be done in such a way that all joints are full of mortar.
- b. For all exposed brickworks, double scaffolding having two sets of vertical supports shall be provided.
- c. Bricks required for brick masonry with mud mortar need not be soaked.

**Answer options :**

- |                  |                       |
|------------------|-----------------------|
| (1) a and b only | (2) a and c only      |
| (3) b and c only | (4) None of the above |

---

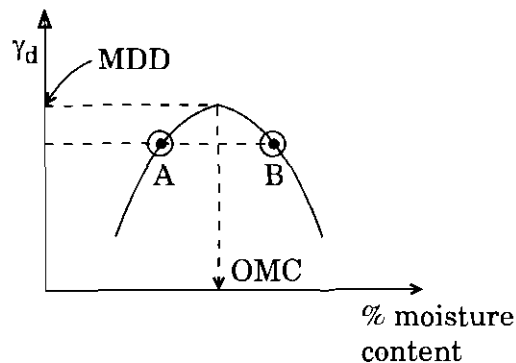
89. The nominal lead and lift allowed for earthwork in excavations of foundations are

- |                    |                    |
|--------------------|--------------------|
| (1) 30 m and 1.5 m | (2) 20 m and 2.0 m |
| (3) 15 m and 3.0 m | (4) 10 m and 4.5 m |

90. Which method of depreciation is suitable for finding depreciation of a building having a life of 100 years ?
- (1) Constant percentage method
  - (2) Straight-line method
  - (3) Sinking fund method
  - (4) Quantity survey method

- 
91. For 1 cumec of cement concrete proportion with stone chips 1 : 2 : 4, the required number of cement bags is
- |          |         |
|----------|---------|
| (1) 6.34 | (2) 6.0 |
| (3) 5.5  | (4) 4.5 |

- 
92. In a typical compaction curve as indicated in the diagram, points 'A' and 'B' have same dry densities. Choose the most appropriate statement from the following :



- (1) Soil at 'A' will have more swelling potential and less shrinking upon moisture variation, compared to 'B'.
- (2) Soil at 'A' will have same swelling and shrinking potential as soil at 'B'.
- (3) Soil at 'A' will have less swelling potential and higher shrinking potential compared with soil at 'B'.
- (4) The swelling-shrinking potential for soil at 'A' and 'B' cannot be predicted with the given data.

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93. Select the appropriate alternative from the following :

Soil deposit is called as 'over-consolidated', if

- (1)  $P_o > P_c$
- (2)  $P_o \leq P_c$
- (3)  $P_o = P_c$
- (4)  $P_o < P_c$

where  $P_o$  is the present effective overburden pressure and  $P_c$  is preconsolidation pressure.

---

94. Following are the statements about the major differences between Terzaghi's analysis ('T') and Meyerhof's analysis ('M') of bearing capacity :

- a. 'T' is for homogeneous and isotropic soils but 'M' accounts for non-isotropy.
- b. In 'T', the failure surfaces form upto founding level but in 'M', they are extended upto ground level.
- c. In 'T', the angle of wedge formed beneath the foundation is assumed to be equal to the angle of internal friction of the soil but in 'M', it varies.
- d. In 'T', the load acting on the foundation is concentric and vertical but in 'M', it is assumed as eccentric.

Ascertain the correctness of the above statements and write the correct code.

- (1) Statement a is the only correct statement
- (2) Statements a and b are correct
- (3) Statements b and c are correct
- (4) Statements a and d are correct

95. A 10 m deep canal is constructed in purely cohesive soil having  $c = 0.2 \text{ kg/cm}^2$ ,  $\phi = 0^\circ$ ,  $G = 2.5$ ,  $e = 0.5$ . The stability number is 0.1. In a canal running in full condition, the factor of safety w.r.t. cohesion against failure of side slopes will be

- (1) 1.0
- (2) 1.5
- (3) 2.0
- (4) 2.5

---

96. *Statement A* : Terzaghi's bearing capacity theory assumes strip foundation in the analysis.

*Statement B* : Terzaghi's theory does not consider development of shear resistance in the soil mass above founding level.

- (1) Both the statements A and B are true
- (2) Statement A is true but B is false
- (3) Statement A is false but B is true
- (4) Both the statements A and B are false

---

97. *Statement A* : Plate load test is a short duration test and is not suitable in cohesive soils.

*Statement B* : Plate load test does not record the total settlement of the test plate in clayey soils.

- (1) Both the statements A and B are true but B is not the correct explanation of A
- (2) Statement A is true but B is false
- (3) Statement A is false but B is true
- (4) Both the statements A and B are true and B is the correct explanation of A

98. A soft saturated clayey soil tested unconfined gave an axial stress of  $50 \text{ kN/m}^2$  at failure. The shear strength of the soil is

- (1)  $50 \text{ kN/m}^2$
- (2)  $100 \text{ kN/m}^2$
- (3)  $25 \text{ kN/m}^2$
- (4) None of the above

---

99. Match the following :

- |                       |                                       |
|-----------------------|---------------------------------------|
| a. Electro-osmosis    | I. Provide water free area for work   |
| b. Under reamed pile  | II. Eliminate differential settlement |
| c. Cellular cofferdam | III. Dewatering of fine grained soil  |
| d. Raft foundation    | IV. Foundation for expansive soil     |

- |     | a   | b   | c   | d  |
|-----|-----|-----|-----|----|
| (1) | III | II  | IV  | I  |
| (2) | III | IV  | I   | II |
| (3) | IV  | III | I   | II |
| (4) | I   | IV  | III | II |

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100. A wall 6 m high has a smooth vertical back and retained sand as a backfill which is submerged. The sand has  $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$  and  $\phi = 30^\circ$ . The total active earth pressure is

- (1)  $90 \text{ kN/m}^2$
- (2)  $60 \text{ kN/m}^2$
- (3)  $120 \text{ kN/m}^2$
- (4) None of the above

## सूचना - (पृष्ठ 1 वरून पुढे.....)

- (8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते काँपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या “परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82” यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.
- (9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वतःबरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.

## नमुना प्रश्न

Pick out the correct word to fill in the blank :

**Q. No. 201.** I congratulate you \_\_\_\_\_ your grand success.

- (1) for (2) at  
(3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर “(3) on” असे आहे. त्यामुळे या प्रश्नाचे उत्तर “(3)” होईल. यास्तव खालीलप्रमाणे प्रश्न क्र. 201 समोरील उत्तर-क्रमांक “(3)” हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. 201. (1) (2) (3) (4)

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगातर्फे घेण्यात आलेल्या महाराष्ट्र अभियांत्रिकी सेवा (स्थापत्य) (मुख्य) परीक्षा- 2017 या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ज्ञांचे अभिप्राय विचारात घेऊन आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

उत्तरतालिका - KEY

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
1	2	2	2	4
2	3	1	4	4
3	3	1	3	3
4	2	3	4	3
5	2	4	4	3
6	3	4	3	3
7	3	1	1	2
8	2	2	4	2
9	2	3	2	2
10	2	2	4	3
11	1	4	2	#
12	1	3	4	2
13	3	4	1	2
14	4	4	4	4
15	4	3	4	2
16	1	1	4	4
17	2	4	2	3
18	3	2	4	2
19	2	4	#	3
20	4	2	3	1
21	3	4	1	4
22	4	1	2	2
23	4	4	4	1
24	3	4	1	4
25	1	4	1	3

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
26	4	2	1	3
27	2	4	2	2
28	4	#	2	#
29	2	3	2	1
30	4	1	3	2
31	1	2	1	4
32	4	4	3	2
33	4	1	4	3
34	4	1	3	4
35	2	1	2	1
36	4	2	3	2
37	#	2	4	1
38	3	2	4	1
39	1	3	3	4
40	2	1	3	#
41	4	3	3	3
42	1	4	3	1
43	1	3	2	4
44	1	2	2	3
45	2	3	2	2
46	2	4	3	2
47	2	4	#	2
48	3	3	2	3
49	1	3	2	3
50	3	3	4	2

प्रश्नपत्रिका क्र. २ (स्थापत्य अभियांत्रिकी पेपर - II)

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
51	4	3	2	2
52	3	2	4	3
53	2	2	3	3
54	3	2	2	2
55	4	3	3	2
56	4	#	1	2
57	3	2	4	1
58	3	2	2	1
59	3	4	1	3
60	3	2	4	4
61	2	4	3	4
62	2	3	3	1
63	2	2	2	2
64	3	3	#	3
65	#	1	1	2
66	2	4	2	4
67	2	2	4	3
68	4	1	2	4
69	2	4	3	4
70	4	3	4	3
71	3	3	1	1
72	2	2	2	4
73	3	#	1	2
74	1	1	1	4
75	4	2	4	2

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
76	2	4	#	4
77	1	2	3	1
78	4	3	1	4
79	3	4	4	4
80	3	1	3	4
81	2	2	2	2
82	#	1	2	4
83	1	1	2	#
84	2	4	3	3
85	4	#	3	1
86	2	3	2	2
87	3	1	2	4
88	4	4	3	1
89	1	3	3	1
90	2	2	2	1
91	1	2	2	2
92	1	2	2	2
93	4	3	1	2
94	#	3	1	3
95	3	2	3	1
96	1	2	4	3
97	4	3	4	4
98	3	3	1	3
99	2	2	2	2
100	2	2	3	3