

मराठी, इंग्रजी, सामान्य अध्ययन आणि अभियांत्रिकी अभियोग्यता चाचणी

वेळ : 1½ (दीड) तास

एकूण प्रश्न : 100

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 चौकोनात न विसरता बॉलपेनने लिहावा.
- (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 दर्शविला 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 घ्यावा.
- (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 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 उमेदवारांना 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 सूचनेबिना हे सील उघडू नये

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पुढील उतारावाचून त्यावर आधारित 1 ते 5 प्रश्नांची उत्तरे द्या :

धर्माच्या कोणत्याही क्षेत्रात आपण नजर टाकली तर आपल्याला असेच दिसेल की ज्ञानेश्वर, एकनाथ, तुकाराम यांनी अत्यंत उदार व उदात्त उपदेश केला असूनही त्यातून सामाजिक धर्माची प्रेरणा कोणी घेतलीच नाही. धनाचे दान हे धर्मदृष्टीने केवढे पुण्य आहे ? श्रीमंतांनी गरिबांना दान द्यावे असा उपदेश पावलोपावली संतांनी केला आहे. पण येथल्या श्रीमंतांनी दाने कशी दिली ? त्यांनी मंदिरे बांधली, घाट बांधले, त्यांच्या व्यवस्थेसाठी जमिनी दिल्या. अन्नछत्रे घातली. त्यासाठी उत्पन्न नेमून दिले. पण रुग्णालयांसाठी, पाटबंधाऱ्यांसाठी, शेतीसुधारणेसाठी, तुरुंगसुधारणेसाठी, अस्पृश्यांच्या उन्नतीसाठी कोणी दाने दिली नाहीत. याचा अर्थ असा होतो की, स्वतःच्या पारलौकिक कल्याणासाठी, पुण्यासाठी ही दाने दिली जात. त्या लोकांना दीनांची दया येत नसे असे नाही; पण त्या दीनांची कायमची उन्नती व्हावी, या क्षणाला कळवळा येऊन आपण त्याला थोडे द्रव्य देण्याने त्याचा प्रश्न सुटत नाही, तो सोडविण्याचा काही प्रयत्न केला पाहिजे अशी भावनाच कोणाच्या चिंतात येथे उदित झाली नाही. ती झाली असती तर येथे आमूलाग्र क्रांती झाली असती. पाश्चात्य समाज उत्कर्ष पावला तो त्या समाजाच्या धर्मबुद्धीला हे वळण मिळाले म्हणून. रॉकफेलर हे नाव आता जगप्रसिद्ध झाले आहे. त्याने केलेले दान या प्रकारचे आहे. नवकोटनारायण हा शब्द त्याच्या वर्णनाला थिटा पडेल. अपार, अगणित संपत्ती एवढेच म्हणता येईल आणि तरीही त्या संपत्तीची कल्पना येणार नाही. या संपत्तीचे काय करावे असा प्रश्न येताच जॉन रॉकफेलर तरुण वयातच सर्व व्यवसायांतून निवृत्त झाला आणि आयुष्याची पुढली 45 वर्षे संपत्ती दान करण्यातच खर्च केली. रुग्णालये, वैद्यकीय संशोधन, शास्त्रीय संशोधन, ग्रंथालये, सार्वजनिक इमारती, शांततेसाठी प्रयत्न करणारी मंडळे, धर्मसंस्था या सर्वांना त्याने कोटीकोटी रुपयांचे दान केले या दानामध्ये मानवजातीचे कल्याण हा एकच हेतू होता. 'अखिल विश्वातला मानव' हे त्याचे लक्ष्य होते.

1. संतांच्या उपदेशातून आपण कोणती प्रेरणा घेतली नाही, असे लेखकाचे मत आहे.
 - (1) दान देण्याची
 - (2) सामाजिक धर्माची
 - (3) धर्म वाढवण्याची
 - (4) धन संचयाची

2. येथल्या श्रीमंतांनी कशासाठी दाने दिली ?

- अ. मंदिरे बांधण्यासाठी
 - ब. पाट बांधण्यासाठी
 - क. घाट बांधण्यासाठी
 - ड. शेती सुधारण्यासाठी
- (1) अ आणि ड
 - (2) अ आणि ब
 - (3) अ आणि क
 - (4) अ, ब, क आणि ड सर्व

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3. पाश्चात्य समाजाचा विकास कोणत्या कारणांमुळे होतो असे लेखकाने म्हटले आहे ?

- (1) अतिशय श्रीमंत असल्यामुळे
- (2) धनाचा संचय केल्यामुळे
- (3) मोक्ष प्राप्तीमुळे
- (4) धर्म बुद्धिला योग्य वळण मिळाल्याने

4. जॉन रॉकफेलर यांचा दान करण्याचा हेतू कोणता ?

- (1) धर्माचा विकास करणे.
- (2) श्रीमंताचा विकास करणे.
- (3) गरीबांचा विकास करणे.
- (4) संपूर्ण विश्वातील मानवजातीचा विकास करणे.

5. वरील उताऱ्याला योग्य शीर्षक द्या.

- (1) 'धर्मशक्तीचा विकास'
- (2) 'सामाजिक अभ्युदय'
- (3) 'अस्पृश्यांची प्रगती'
- (4) यापैकी नाही

6. 'अं' व 'अः' या दोन वर्णांना _____ असे म्हणतात.

- अ. अनुस्वार
- ब. स्वर
- क. स्वरादी
- ड. व्यंजने

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

7. 'अवशी खाई तूप आणि सकाळी पाही रूप' या म्हणीचा अर्थ ओळखा.

- (1) अति खाणे नुकसानकारक असते.
- (2) आरशात तोंड पाहून रूप न्याहाळणे.
- (3) स्वतःची चूक लपविण्याचा प्रयत्न करणे.
- (4) अतिशय उतावळेपणाची कृती.

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8. 'हातावर तुरी देणे' या वाक्यप्रचाराचा अर्थ ओळखा.

- अ. कोणतेही काम न होणे.
 - ब. डोळ्यांदेखत फसवून निसटून जाणे.
 - क. जबाबदारी झटकून मोकळे होणे.
 - ड. गोड गोड बोलून फसविणे.
- (1) फक्त अ बरोबर
 (2) फक्त ब बरोबर
 (3) क आणि ड दोन्ही बरोबर
 (4) यापैकी नाही

9. 'उत्कर्ष' या शब्दाच्या विरुद्धार्थी शब्द ओळखा.

- अ. अपकर्ष
 - ब. यश
 - क. अबोल
 - ड. निर्णायक
- (1) फक्त अ बरोबर
 (2) फक्त ब बरोबर
 (3) अ, ब, क आणि ड बरोबर
 (4) सर्व चूक

10. 'मी रोज सकाळी पहाटे उठतो व एक तासभर शाळेचा अभ्यास करतो' यातील वाक्यप्रकार कोणता ?

- अ. केवळ वाक्य
 - ब. संयुक्त वाक्य
 - क. प्रधान वाक्य
 - ड. गौण वाक्य
- (1) अ आणि ब दोन्ही बरोबर
 (2) फक्त ब बरोबर
 (3) फक्त क आणि ड बरोबर
 (4) सर्व चूक

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

If from a hilltop you could watch a panther stalking his prey, he would offer a most interesting spectacle. You would see him taking advantage of every bush, of every tree trunk and of every stone behind which to take cover. He can flatten himself to the ground in an amazing fashion. His colouration renders him invisible, unless you have the keenest eyesight. I once watched one through a pair of binoculars and was amazed at the really wonderful sense of woodcraft the panther had. Then comes the final rush. In a couple of bounds and with lightning speed, he reaches his prey.

16. Give the meaning of the idiom 'to take advantage of'.

- (1) Profit selfishly by exploiting
 - (2) Put to good use
 - (3) None of these
 - (4) All of these
-

17. What is the word for the phenomena 'his colouration renders him invisible' ?

- (1) Concentration
 - (2) Commouflagne
 - (3) Configuration
 - (4) Camouflage
-

18. What is the panther doing in the story ?

- | | |
|-------------|----------------|
| (1) Hiding | (2) Stalking |
| (3) Rushing | (4) Flattening |
-

19. With the help of which instrument did the writer watch the panther ?

- | | |
|----------------|-------------------|
| (1) Spectacle | (2) Binoculars |
| (3) Tree trunk | (4) None of these |
-

20. How was the panther stalking his prey ?

- (1) Hiding behind the tree trunk
 - (2) Taking advantage of every bush
 - (3) Flatten himself to the ground
 - (4) All of these
-

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21. खालीलपैकी कोणता जिल्हा/कोणत्या जिल्ह्यांचे 100% भौगोलिक क्षेत्र गोदावरी नदी खोऱ्यात येत **नाही** ?

- (1) औरंगाबाद आणि बीड (2) लातूर
(3) जालना आणि परभणी (4) हिंगोली आणि नांदेड

Which of the following district/districts does **not** have 100% geographical area in the Godavari river basin ?

- (1) Aurangabad and Beed (2) Latur
(3) Jalna and Parbhani (4) Hingoli and Nanded

22. सन 2011 च्या जणगणनेनुसार, _____ आणि _____ या जिल्ह्यांची 15 टक्केपेक्षा कमी लोकसंख्या शहरांमध्ये रहात आहे.

- (1) गडचिरोली आणि सिंधुदूर्ग (2) गडचिरोली आणि गोंदिया
(3) गोंदिया आणि सिंधुदूर्ग (4) गोंदिया आणि वाशिम

According to 2011 Census, _____ and _____ districts have less than 15% of their population living in urban areas.

- (1) Gadchiroli and Sindhudurg (2) Gadchiroli and Gondia
(3) Gondia and Sindhudurg (4) Gondia and Washim

23. खालील विधाने विचारात घ्या :

- अ. 28 जुलै 2000 रोजी भारत सरकारने राष्ट्रीय कृषी धोरण जाहीर केले.
ब. 24 जुलै 1991 रोजी भारत सरकारने नवीन औद्योगिक धोरण जाहीर केले.
क. 1984 मध्ये भारत सरकारने नवीन संगणक धोरण जाहीर केले.
वरीलपैकी कोणते/ती विधान/ने **असत्य** आहे/आहेत ?

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

Consider the following statements :

- a. The Government of India announced a National Agriculture Policy on July 28, 2000.
b. The Government of India announced a New Industrial Policy on July 24, 1991.
c. The Government of India announced the New Computer Policy in 1984.

Which of the statement/s given above is/are **incorrect** ?

- (1) a and b (2) b and c
(3) Only c (4) None of these

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

24. खालील विधाने विचारात घ्या :

- अ. ऑक्टोबर 1945 मध्ये जवाहरलाल नेहरू यांच्या अध्यक्षतेखाली राष्ट्रीय नियोजन समितीची स्थापना झाली.
 ब. मार्च 1950 मध्ये नियोजन आयोगाची स्थापना झाली.
 क. ऑगस्ट 1952 मध्ये राष्ट्रीय विकास मंडळाची स्थापना झाली.

वरीलपैकी कोणती विधाने सत्य आहेत ?

- (1) अ आणि ब (2) ब आणि क
 (3) अ आणि क (4) वरील सर्व

Consider the following statements :

- a. The National Planning Committee was set up in October 1945 under the Chairmanship of Jawaharlal Nehru.
 b. Planning Commission was set up in March 1950.
 c. The National Development Council was set up in August 1952.

Which of the statements given above are correct ?

- (1) a and b (2) b and c
 (3) a and c (4) All of the above

25. खालील विधाने विचारात घ्या :

- अ. भारतीय बँकांना प्रत्येक वर्षी अग्रक्रम क्षेत्राला 40% कर्ज देण्याची गरज आहे.
 ब. परकिय बँकांनी केवळ 32% अग्रक्रम क्षेत्राला कर्ज पुरवठा करण्याचे लक्ष्यपूर्ण केले पाहिजे.
 क. सर्व भारतीय बँकांना अग्रक्रम क्षेत्राला कर्ज पुरवठा करण्याचे लक्ष्य अनिवार्य नाही.

वरीलपैकी कोणते/ती विधान/ने बरोबर आहे/आहेत ?

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

Consider the following statements :

- a. Indian Banks need to lend 40 percent to the priority sector every year.
 b. Foreign Banks have to fulfil only 32 percent priority sector lending target.
 c. All Indian Banks do not have to follow the compulsory target of priority sector lending.

Which of the statement/s given above is/are correct ?

- (1) a and b (2) Only c
 (3) b and c (4) None of these

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26. भारतीय रिझर्व्ह बँकेची रोखता समायोजन सुविधा याला परवानगी देते
 अ. भारतीय रिझर्व्ह बँकेला रोजच्या रोज बाजारातील रोखता व्यवस्थापन करणे.
 ब. बाजार व्याजदराचे संकेत प्रसारित करणे.

वर दिलेल्या विधानापैकी कोणते/कोणती विधान बरोबर आहेत ?

- (1) फक्त अ (2) फक्त ब
 (3) अ आणि ब दोन्ही (4) वरीलपैकी कोणतेही नाही

Liquidity Adjustment facility by RBI allows

- a. RBI to manage market liquidity on daily basis.
 b. Transmit interest rate signals to the market.

Which of the statements given above is/are correct ?

- (1) Only a (2) Only b
 (3) Both a and b (4) None of the above

27. सन 2011 मध्ये भारताचा मानवी विकास निर्देशांक _____ होता.

- (1) 134 (2) 120
 (3) 140 (4) 130

India's Human Development Index Number was _____ in the year 2011.

- (1) 134 (2) 120
 (3) 140 (4) 130

28. भारतातील पहिल्या महिला बँकेची स्थापना कोणत्या वर्षाच्या अर्थ संकल्पात करण्यात आली ?

- (1) 2010 – 11 (2) 2012 – 13
 (3) 2013 – 14 (4) 2015 – 16

India's First Women's Bank was established in which year's budget ?

- (1) 2010 – 11 (2) 2012 – 13
 (3) 2013 – 14 (4) 2015 – 16

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

29. पंचायत समितीचे विसर्जन करण्यात आले असेल तर नव्याने निवडून आलेल्या पंचायत समितीचा कार्यकाल किती असतो ?

- (1) 6 महिने
- (2) $2\frac{1}{2}$ वर्षे
- (3) एक वर्ष
- (4) विसर्जित पंचायत समितीच्या उर्वरित कार्यकाल इतका

If the Panchayat Samiti is immersed, then how long will be the tenure of the newly elected Panchayat Samiti ?

- (1) 6 months
- (2) $2\frac{1}{2}$ years
- (3) One year
- (4) As much as the remaining tenure of the immersed Panchayat Samiti

30. जोड्या जुळवा :

- | | |
|-------------------|--------------------------------------|
| अ. अनुच्छेद - 156 | I. राज्यपालांचे कार्यकारी अधिकार |
| ब. अनुच्छेद - 154 | II. राज्यपालांचा कालावधी |
| क. अनुच्छेद - 153 | III. राज्यपालांचे स्वेच्छाधीन अधिकार |
| ड. अनुच्छेद - 155 | IV. राज्यपाल पद |
| | V. राज्यपालांची नियुक्ती |

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

Match the pairs :

- | | |
|------------------|--------------------------------------|
| a. Article - 156 | I. Executive authority of Governor |
| b. Article - 154 | II. Tenure of Governor |
| c. Article - 153 | III. Discretionary power of Governor |
| d. Article - 155 | IV. Office of Governor |
| | V. Appointment of Governor |

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

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31. 'रन फॉर लाडली हाफ मॅरेथॉन स्पर्धा' कोणत्या कारणासाठी आयोजित करण्यात आली होती ?

- (1) महिला सुरक्षासंबंधी लोकांमध्ये जागरूकता निर्माण होण्यासाठी
- (2) लहान मुलांबद्दल जागरूकता निर्माण करणे व त्यांच्या उज्वल भविष्यासाठी
- (3) लहान मुलींच्या भविष्याबद्दल जागरूकता निर्माण करण्यासाठी
- (4) दिव्यांगाप्रती लोकांमध्ये प्रेम निर्माण करण्यासाठी

For what reason were the 'Run for Laadli Half Marathon Competitions' organized ?

- (1) To cause awareness amongst the people about women protection
- (2) To cause awareness about children and their better future
- (3) To cause awareness about little girls for their better future
- (4) To cause love for physically handicapped people

32. भारतात वार्ताहरांचे हल्ल्यांपासून संरक्षण करणारा कायदा मंजूर करणारे खालीलपैकी कोणते राज्य पहिले ठरले आहे ?

- | | |
|----------------|-----------------|
| (1) गोवा | (2) हरियाणा |
| (3) महाराष्ट्र | (4) मध्य प्रदेश |

Which of the following became the first State in India to pass a law to protect journalists from attack ?

- | | |
|-----------------|--------------------|
| (1) Goa | (2) Haryana |
| (3) Maharashtra | (4) Madhya Pradesh |

33. सन 2018 पर्यंत भारताची कोणती सीमा बंद केली जाणार असल्याची घोषणा भारताच्या गृहमंत्र्यांनी केली आहे ?

- (1) भारत - पाकिस्तान
- (2) भारत - नेपाळ
- (3) भारत - बांगलादेश
- (4) भारत - श्रीलंका

Which border of India will be sealed by 2018 as announced by the Home Minister of India ?

- (1) India - Pakistan
- (2) India - Nepal
- (3) India - Bangladesh
- (4) India - Sri Lanka

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34. 'दि गुटमाकर' आणि 'इंडियन इंस्टीट्यूट ऑफ पॉप्युलेशन साइंसेजच्या' 2017 च्या अहवाल नुसार भारतामध्ये प्रत्येकवर्षी किती महिलांचा गर्भपातामुळे मृत्यु होतो ?

- (1) 10 लाख
- (2) 20 लाख
- (3) 25 लाख
- (4) 30 लाख

According to year 2017 report of 'The International Institute of Gutmaker' and 'Indian Institute of Population Sciences', how many women died because of abortion in every year in India ?

- (1) 10 Lakh
- (2) 20 Lakh
- (3) 25 Lakh
- (4) 30 Lakh

35. मानव संसाधन विभागाचे केंद्रीय मंत्री श्री प्रकाश जावडेकर यांनी रुसा (RUSA) साठीचे पोर्टल आणि मोबाईल ॲप सुरु केले. तेव्हा रुसा (RUSA) म्हणजे काय ?

- (1) राजकीय उच्च शिक्षण अभियान
- (2) राष्ट्रीय उच्चतर शिक्षा अभियान
- (3) राष्ट्रीय उच्चतर शिक्षण आंदोलन
- (4) रिजनल उच्च शिक्षा अभियान

Union Minister of Human Resource Development Shri Prakash Javadekar has launched Portal and mobile app for RUSA. What is the meaning of RUSA ?

- (1) Rajkiya Uchch Shikshan Abhiyan
- (2) Rashtriya Uchchatar Shiksha Abhiyan
- (3) Rashtriya Uchchatar Shikshan Andolan
- (4) Regional Uchch Shiksha Abhiyan

36. जी.एस.टी. (GST) ची अंमलबजावणी कोणत्या घटनादुरुस्ती कायद्याने करण्यात आली ?

- | | |
|---------|---------|
| (1) 101 | (2) 108 |
| (3) 120 | (4) 106 |

GST was introduced as which Amendment Act ?

- | | |
|---------|---------|
| (1) 101 | (2) 108 |
| (3) 120 | (4) 106 |

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37. खालीलपैकी ओझोनचे सर्वात मोठे मारक शत्रू कोणते आहेत ?

- (1) क्लोरिन व नायट्रोजन
- (2) कार्बन मोनोक्साइड
- (3) कार्बन डायऑक्साइड
- (4) सल्फर डायऑक्साइड

Which of the following is most harmful for ozone depletion ?

- (1) Chlorine and nitrogen
- (2) Carbon monoxide
- (3) Carbon dioxide
- (4) Sulphur dioxide

38. श्री सुंदरलाल बहुगुणा यांच्या नेतृत्वाखाली भारतातील कोणत्या राज्यात कोणती चळवळ उभारली होती ?

- (1) चिपको चळवळ - तमिळनाडु
- (2) सायलेंट व्हॅली चळवळ - केरळ
- (3) नर्मदा बचाव आंदोलन - मध्य प्रदेश
- (4) अपिको चळवळ - कर्नाटक

Which movement in a State of India was lead under the leadership of Sundarlal Bahuguna ?

- (1) Chipko Revolution - Tamil Nadu
- (2) Silent Valley Revolution - Kerala
- (3) Narmada Bachao Andolan - Madhya Pradesh
- (4) Appiko Revolution - Karnataka

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39. 11 डिसेंबर 1946 रोजी भारतीय घटना समितीचे अध्यक्ष म्हणून कोणाची निवड करण्यात आली ?

- (1) डॉ. राजेंद्र प्रसाद
- (2) डॉ. बाबासाहेब आंबेडकर
- (3) डॉ. सच्चिदानंद सिन्हा
- (4) पुरुषोत्तम दास टंडन

Who was selected as the President of Constitution Committee of India on 11th December 1946 ?

- (1) Dr. Rajendra Prasad
- (2) Dr. Babasaheb Ambedkar
- (3) Dr. Sachidanand Sinha
- (4) Purushottam Das Tandon

40. पुढील संस्थांची कालक्रमानुसार मांडणी करा :

- अ. छत्रपती शिवाजी कॉलेज, सातारा
 - ब. महाराजा सयाजीराव हायस्कूल, सातारा
 - क. सिल्व्हर ज्युबिली रूरल ट्रेनिंग कॉलेज, सातारा
 - ड. छत्रपती शाहू बोर्डिंग हाऊस, सातारा
- (1) अ, ब, क, ड
 - (2) ड, क, ब, अ
 - (3) ड, ब, क, अ
 - (4) ड, अ, क, ब

Arrange the following institutions in their chronological order :

- a. Chhatrapati Shivaji College, Satara
 - b. Maharaja Sayajirao High School, Satara
 - c. Silver Jubilee Rural Training College, Satara
 - d. Chhatrapati Shahu Boarding House, Satara
- (1) a, b, c, d
 - (2) d, c, b, a
 - (3) d, b, c, a
 - (4) d, a, c, b

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41. When a body is in equilibrium under the action of three forces, then each force is proportional to the _____ angle between the other two forces.
- (1) \cos
 - (2) \sin
 - (3) \tan
 - (4) \cot
-
42. If u and v are initial and final velocities of a body having an indirect impact on a fixed plane and α and θ are angles with line of impact made by initial and final velocities and if e is coefficient of restitution, then Newton's law of collision which holds good for this impact is
- (1) $v \cos \theta = eu \cos \alpha$
 - (2) $u \cos \theta = ev \cos \alpha$
 - (3) $v \sin \theta = eu \sin \alpha$
 - (4) $u \sin \theta = eu \sin \alpha$
-
43. Complete determination of resultant force of non-concurrent forces is
- a. determination of magnitude.
 - b. determination of direction.
 - c. determination of point on its line of action.
- (1) Only a and b
 - (2) Only a and c
 - (3) a, b and c
 - (4) None of these
-
44. D – Alembert's principle states that if a rigid body is acted upon by system of forces, this system of forces may be reduced to a single resultant force whose _____ may be found out by the method of graphic statics.
- (1) magnitude
 - (2) direction
 - (3) line of action
 - (4) magnitude, direction and line of action

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45. The centre of gravity of right circular cone of height 'h' lies at a distance _____ from vertex along the axis of rotation.

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

46. In order to study the dynamic response of a body, it is important to locate the body's

- (1) colour (2) emissivity
(3) centre of mass (4) None of these

47. The component of the resultant linear impulse along any direction is equal to

- (1) zero.
(2) change in the component of momentum in that direction.
(3) change in the component of momentum in opposite direction.
(4) None of these

48. In technique used to reduce a coplanar or parallel force system to a single resultant force, the resultant force is equal to

- (1) sum of all forces in the system.
(2) sum of all positive forces in the system.
(3) sum of all negative forces in the system.
(4) None of these

49. A projectile is projected from a point on ground with velocity of projection 'u' and angle of projection ' α '. How much maximum height can the projectile reach ?

- (1) $h = \frac{u \sin \alpha}{2g}$
(2) $h = \frac{u^2 \sin^2 \alpha}{2g}$
(3) $h = \frac{u^2 \sin \alpha}{2g}$
(4) $h = \frac{u \sin^2 \alpha}{2g}$

50. A concurrent force system is one in which the lines of action of all the forces intersect at a common point O, then the force system produces

- (1) no moment about this point. (2) moment about this point.
(3) Both (1) and (2) are produced. (4) None of these
-

51. Parallelogram law of forces states that if two forces acting simultaneously at a point be represented in magnitude and direction by two adjacent sides of parallelogram, their resultant may be represented in magnitude and direction by

- (1) longer side of the other two sides.
(2) shorter side of the other two sides.
(3) diagonal of the parallelogram which passes through their points of intersection.
(4) diagonal of the parallelogram which does not pass through their point of intersection.
-

52. In friction, friction force F is termed as _____ when sliding occurs at the contacting surface.

- (1) kinetic frictional force (2) kinematic frictional force
(3) static frictional force (4) None of these
-

53. The negative ratio of the relative velocities of two colliding bodies after and before collision is called as

- (1) Coefficient of Restitution (2) Coefficient of Friction
(3) Elastic Collision (4) Inelastic Collision
-

54. An automobile of mass 1000 kg moving at a velocity 54 kmph, moves along a sag. This sag is a part of a circle of 15 m radius. What is the reaction between the automobile and road while travelling at the lowest part of sag ?

- (1) 24.8 kN (2) 248 kN
(3) 2480 kN (4) 24800 kN
-

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55. The required minimum compressive strength of building bricks as recommended by IS 1077 – 1957 and 1970 is
- (1) 140 kg/cm²
 - (2) 105 kg/cm²
 - (3) 70 kg/cm²
 - (4) 35 kg/cm²
-
56. The minimum compressive strength for rapid hardening portland cement after 72 hours should be
- (1) 18 N/mm²
 - (2) 28 N/mm²
 - (3) 24 N/mm²
 - (4) None of these
-
57. The maximum settlement for the isolated foundation on clayey soils should be limited to
- (1) 65 mm
 - (2) 25 mm
 - (3) 40 mm
 - (4) 100 mm
-
58. As per IS 1893 – 2002, Zone I shown in 'Seismic Zones of India' map corresponds to
- (1) Maximum intensity I
 - (2) Maximum intensity III
 - (3) Maximum intensity V
 - (4) Maximum intensity VII
-
59. Which of the following is a disadvantage of framed structures ?
- (1) Flexibility in planning
 - (2) Speed of construction
 - (3) Economy
 - (4) Span length

60. What is fineness modulus of course sand ?

- (1) 2.9 – 3.2
 - (2) 2.4 – 3.0
 - (3) 1.5 – 2.1
 - (4) 1.8 – 2.4
-

61. A total station is a combination of

- (1) Theodolite and EDM
 - (2) Electronic theodolite and EDM
 - (3) Compass and EDM
 - (4) Electronic compass and EDM
-

62. Which of the following Electronic Distance Measurements is useful in major construction where alignment is to be done precisely and quickly ?

- (1) Optical theodolite
 - (2) Digital theodolite
 - (3) Laser theodolite
 - (4) Vernier theodolite
-

63. Reduced Level (R.L.) of the floor at building is 74.400 m, staff reading on the floor is 1.625 m and staff reading when it is held inverted with bottom touching the ceiling of a hall is 2.870 m, then the height of the ceiling above the floor is

- (1) 3.593 m
 - (2) 3.953 m
 - (3) 4.594 m
 - (4) 4.495 m
-

64. A lamp at the top of a lighthouse is visible just above the horizon from a station at sea level. The distance of the lamp from the station is 30 km. The height of the lighthouse is

- (1) 60.57 m
 - (2) 30.0 m
 - (3) 20.61 m
 - (4) 54.0 m
-

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

65. A device/devices which transfers heat from low temperature region to high temperature is

- (1) Only refrigerator
- (2) Only heat pump
- (3) Both refrigerator and heat pump
- (4) None of these

66. _____ possesses lowest thermal conductivity among the following materials :

- | | |
|----------------|-----------|
| (1) Sawdust | (2) Ash |
| (3) Glass wool | (4) Freon |

67. _____ is not the assumption of Fourier's equation of heat conduction.

- (1) Constant temperature difference
- (2) Uniform area of cross-section
- (3) Steady heat flow
- (4) Homogeneous substance

68. If the designation of a deep-groove ball bearing is 6014, then bore diameter is _____ mm.

- | | |
|--------|--------|
| (1) 60 | (2) 70 |
| (3) 84 | (4) 74 |

69. If 'm' is the mass per unit length of belt, 'T' is maximum allowable belt tension and 'T_c' is centrifugal tension, for maximum power transmission, the velocity of the belt is

a. $\sqrt{\frac{T}{3m}}$

b. $\sqrt{\frac{T_c}{m}}$

c. $\sqrt{\frac{3T}{m}}$

d. $\sqrt{\frac{m}{T_c}}$

Which of the given above is/are correct ?

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

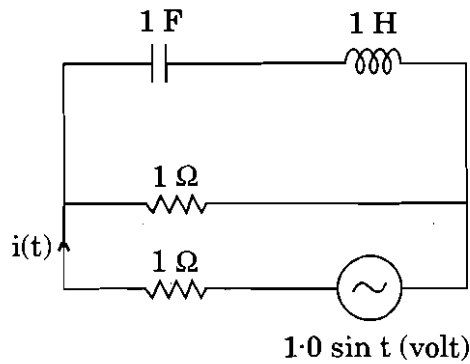
कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

70. Which gears are used to transmit heavy loads, high speeds at low noise level between parallel shaft ?
- (1) Spur gears
 - (2) Helical gears
 - (3) Bevel gears
 - (4) Worm gears
-
71. Which is inversion of four-bar mechanism ?
- (1) Coupling rod of locomotive
 - (2) Whitworth quick return motion mechanism
 - (3) Elliptical trammel
 - (4) Oldham's coupling
-
72. Which of the following material requires the largest shrinkage allowance, while making a pattern for casting ?
- (1) Malleable Iron
 - (2) Plain Carbon Steel
 - (3) Lead
 - (4) Brass
-
73. _____ is widely used in tool steels because the tool will maintain its hardness even at red heat.
- (1) Chromium
 - (2) Nickel
 - (3) Tungsten
 - (4) Vanadium
-
74. Maximum fluctuation of energy of flywheel is defined as
- (1) sum of maximum and minimum energy.
 - (2) ratio of maximum and minimum energy.
 - (3) ratio of minimum and maximum energy.
 - (4) difference between maximum and minimum energy.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

75. The RMS value of the current $i(t)$ in the circuit shown below is



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

76. Three resistances of 3Ω each are connected in delta. The value of the resistance in the equivalent star is

- (1) 27Ω (2) 9Ω (3) 1.5Ω (4) 1Ω

77. The maximum power transferred to a load for a resistive Thevenin's circuit and condition for which it occurs are

- (1) $P_{\max} = \frac{4V_T^2}{R_T}$ and $R_L = R_T$ (2) $P_{\max} = \frac{V_T^2}{4R_T}$ and $R_L = R_T$
 (3) $P_{\max} = \frac{2V_T^2}{R_T}$ and $R_L = R_T$ (4) $P_{\max} = \frac{V_T^2}{2R_T}$ and $R_L = \frac{R_T}{2}$

78. An electric heater is rated as 1 kW, 250 V. Calculate the current taken by it if it is connected to 200 V supply

- (1) 4.5 A (2) 3.2 A
 (3) 5 A (4) 3 A

79. For a series R – C circuit V_R is (the voltage across the Resistance, R and) measured to be 8 V and V_C is (the voltage across the capacitance, C and) measured as 6 V. The ac source voltage will be

- (1) 14 V (2) 8 V (3) 10 V (4) 12 V

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

80. The open circuit test in a transformer is performed with

- (1) rated transformer voltage
 - (2) rated transformer current
 - (3) direct current
 - (4) high frequency supply
-

81. RMS value of a current given by
 $i = 10 + 5 \cos (628 t + 30^\circ)$ is

- | | |
|------------|------------|
| (1) 3.53 A | (2) 5 A |
| (3) 10.6 A | (4) 15.6 A |
-

82. A balanced star connected load has a line voltage V_L , line current I_L and impedance per phase Z . When it is connected in equivalent delta connected system for same line values of voltage and current as in case of star connected system, the per phase impedance will be

- (1) $Z \Omega$
 - (2) $\sqrt{3} Z \Omega$
 - (3) $3Z \Omega$
 - (4) Not determined from given data
-

83. In the equivalent circuit of a practical transformer, its magnetizing impedance is determined by

- (1) Short circuit test
 - (2) Open circuit test
 - (3) Both short circuit and open circuit tests
 - (4) Other than above tests
-

84. A 3-phase load is balanced if all the three phases have the same

- (1) impedance
 - (2) power factor
 - (3) impedance and power factor
 - (4) None of these
-

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

85. The length of the curve $y = \frac{2}{3}x^{3/2}$ between $x = 0$ and $x = 1$ is

- (1) 0.27 (2) 0.67
(3) 1 (4) 1.22
-

86. In Taylor's series expansion of $\exp(x) + \sin(x)$ about the point $x = \pi$, the coefficient of $(x - \pi)^2$ is

- (1) $\exp(\pi)$ (2) $0.5 \exp(\pi)$
(3) $\exp(\pi) + 1$ (4) $\exp(\pi) - 1$
-

87. The function $f(x) = 2x^3 - 3x^2 - 36x + 2$ has its maxima at

- (1) Only $x = -2$ (2) Only $x = 0$
(3) Only $x = 3$ (4) Both $x = -2$ and $x = 3$
-

88. The coefficient of the x^5 term in the Maclaurin polynomial for $\sin(2x)$ is

- (1) 0 (2) 0.00833333
(3) 0.016667 (4) 0.26667
-

89. In the matrix equation $Px = q$, which of the following is a necessary condition for the existence of at least one solution for the unknown vector x ?

- (1) Augmented matrix $[Pq]$ must have the same rank as matrix P
(2) Vector q must have only non-zero elements
(3) Matrix P must be singular
(4) Matrix P must be square
-

90. If $(D^2 + 1)y = \sin x \sin 2x$, then the particular integral is

- (1) $\frac{1}{4}x \sin x + \frac{1}{16} \cos 3x$
(2) $\frac{1}{4}x \sin x - \frac{1}{16} \cos 3x$
(3) $\frac{1}{4}x \sin 2x + \frac{1}{16} \cos 3x$
(4) $\frac{1}{4}x \sin 2x - \frac{1}{16} \cos 3x$
-

91. If $x = uv$ and $v = \frac{u+v}{u-v}$, then $\frac{\partial(u, v)}{\partial(x, y)}$ is equal to

- (1) $\frac{(u+v)^2}{2uv}$ (2) $\frac{(u+v)^2}{4uv}$
 (3) $\frac{(u-v)^2}{4uv}$ (4) $\frac{(u-v)^2}{2uv}$

92. If $\phi(x, y, z) = 0$, then the value of $\left(\frac{\partial z}{\partial y}\right)_x \left(\frac{\partial x}{\partial z}\right)_y \left(\frac{\partial y}{\partial x}\right)_z$ is equal to

- (1) 0 (2) 1 (3) $-\frac{1}{2}$ (4) -1

93. Given a function $f(x, y) = 4x^2 + 6y^2 - 8x - 4y + 8$. The optimum value of $f(x, y)$

- (1) is a minimum equal to $10/3$.
 (2) is a maximum equal to $10/3$.
 (3) is a minimum equal to $8/3$.
 (4) is a maximum equal to $8/3$.

94. For $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$, the particular integral is

- (1) $e^{-3x}(1 + \log x)$ (2) $-e^{-3x}(1 + \log x)$
 (3) $e^{3x}(1 + \log x)$ (4) $-e^{3x}(1 + \log x)$

95. $\int_0^{\pi/2} \frac{\log(1 + a \sin^2 x)}{\sin^2 x} dx$ is also shown as

- (1) $\pi(\sqrt{a-1} + 1)$ (2) $\pi(\sqrt{a+1} - 1)$
 (3) $\frac{\pi}{2}(\sqrt{a+1} - 1)$ (4) $\pi(\sqrt{a-1} - 1)$

कृपया कामासाठी जागा / SPACE FOR ROUGH WORK

96. The partial differential equation $5 \frac{\partial^2 z}{\partial x^2} + 6 \frac{\partial^2 z}{\partial y^2} = xy$ is classified as

- (1) elliptic (2) parabolic
(3) hyperbolic (4) None of these

97. The area of the curve $a^2 x^2 = y^3 (2a - y)$ is found out to be

- (1) πa (2) πa^3 (3) $\pi^2 a$ (4) πa^2

98. Consider the equation :

$$y'' + \left(\frac{x^2 \cdot \sin(x)}{e^{2\sqrt{\pi}}} \right)^8 (y')^3 + xy = 10, \text{ is}$$

- (1) an ordinary linear differential equation of order 2.
(2) an ordinary non-linear differential equation of order 2.
(3) an ordinary linear differential equation of order 3.
(4) an ordinary non-linear differential equation of order 3.

99. Matrix $[A] = \begin{bmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{bmatrix}$.

The rank of matrix is

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

100. Choose the correct set function which are linearly dependent :

- (1) $\sin x, \sin^2 x$ and $\cos^2 x$
(2) $\cos x, \sin x$ and $\tan x$
(3) $\cos 2x, \sin^2 x$ and $\cos^2 x$
(4) $\cos 2x, \sin x$ and $\cos x$

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, गट अ व ब संयुक्त (पूर्व) परीक्षा - 2018" या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम 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
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प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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48	4	3	3	3
49	2	4	3	2
50	1	1	4	3

Date:10th Sept, 2018

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
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प्रश्न क्रमांक	उत्तरे			
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Date:10th Sept, 2018

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

K12

2

A

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

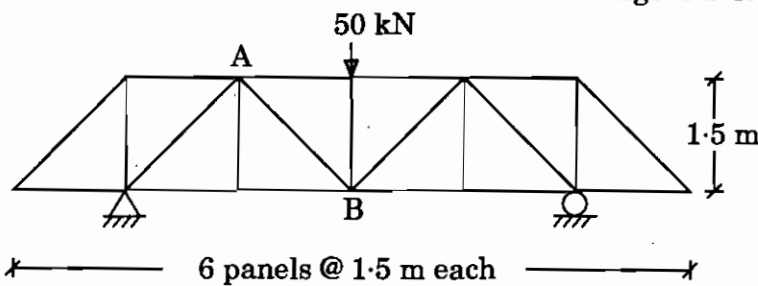
1. "The partial derivative of the total internal energy in a beam, with respect to the load applied at any point is equal to the deflection at that point." This is the statement of

- (1) Moment area theorem (2) Castigliano's second theorem
(3) Conjugate beam theorem (4) Müller - Breslau's influence theorem

2. For a fixed beam AB, the support B settles by δ downward, then what is the direction of rotation of point A and B ?

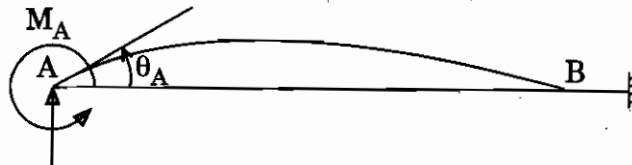
- (1) - ve, - ve (2) + ve, + ve
(3) + ve, - ve (4) - ve, + ve

3. The force in member AB of the truss shown in the figure below is



- (1) 25 kN (c) (2) $25\sqrt{2}$ kN (t)
(3) $25\sqrt{2}$ kN (c) (4) 25 kN (t)

4. For the given figure, the moment at A, whose far end is fixed, M_A is

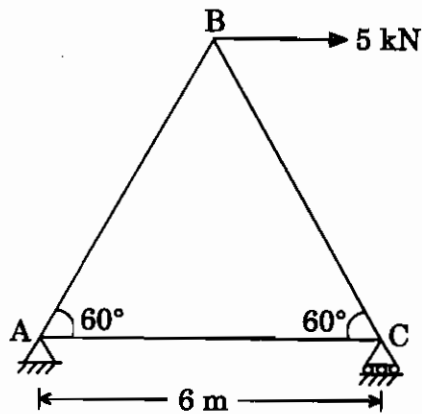


- (1) $\frac{3EI}{l} \cdot \theta_A$ (2) $\frac{4EI}{l} \cdot \theta_A$ (3) $\frac{2EI}{l} \cdot \theta_A$ (4) $\frac{6EI}{l} \cdot \theta_A$

5. The distribution factor is

- (1) Ratio of stiffness of member and member
(2) Ratio of stiffness of near joint and far joint
(3) Ratio of stiffness of member and joint (sum of member stiffness)
(4) Ratio of stiffness of joint and member

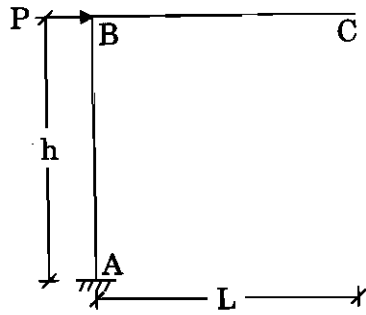
6. Force in the member BC of the truss shown in the figure below is



- (1) 5 KN (tensile)
 (2) Zero
 (3) 2.88 KN (compressive)
 (4) 5 KN (compressive)
-
7. A fixed beam AB of span L is subjected to a clockwise moment M at a distance 'a' from end A. Fixed end moment at end A will be
- (1) $\frac{M}{L^2} (L - a) (L - 3a)$ (2) $\frac{M}{L^2} a (2L - 3a)$
 (3) $\frac{M}{L^2} a (L - a)$ (4) $\frac{M}{L^2} (L - a) (2L - a)$
-
8. A beam of span l is fixed at one end and simply supported at other end. It carries uniformly distributed load of w per unit run over the whole span. The reaction (R) at the simply supported end is
- (1) $R = \frac{3}{8} wl$ (2) $R = \frac{5}{8} wl$
 (3) $R = \frac{1}{2} wl$ (4) $R = \frac{1}{3} wl$
-
9. Degree of static indeterminacy of a rigid jointed plane frame having 15 members, 3 reaction components and 14 joints is
- (1) 2 (2) 3 (3) 6 (4) 8

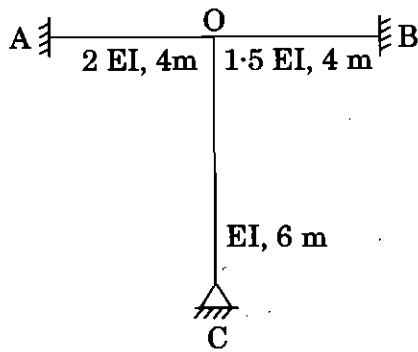
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10. A rigid cantilever frame ABC is loaded and supported as shown in the figure below. The horizontal displacement of point C is



- (1) $\frac{2 Ph^3}{3EI}$ (2) $\frac{Ph^2(2h + L)}{2EI}$
- (3) $\frac{Ph^3}{3EI}$ (4) $\frac{Ph^2(h + L)}{3EI}$

11. The distribution factor for the members OA, OB and OC are

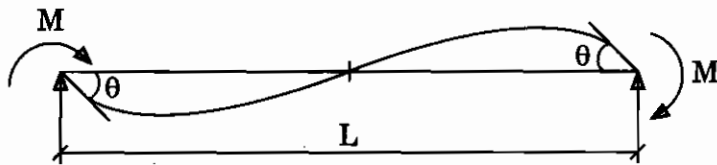


- (1) 0.125, 0.375, 0.5
- (2) 0.375, 0.5, 0.125
- (3) 0.5, 0.125, 0.375
- (4) 0.5, 0.375, 0.125

12. The stiffness coefficients K_{ij} indicate

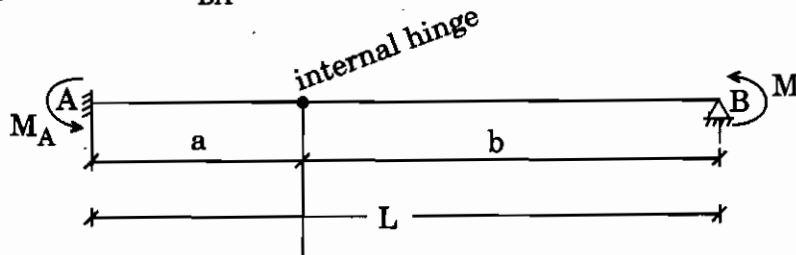
- (1) Force at i due to a unit deformation at j
- (2) Deformation at j due to a unit force at i
- (3) Deformation at i due to a unit force at j
- (4) Force at j due to a unit deformation at i

13. A beam EI-constant of span L is subjected to clockwise moments M at both the ends A and B. The rotation of end A works out to be



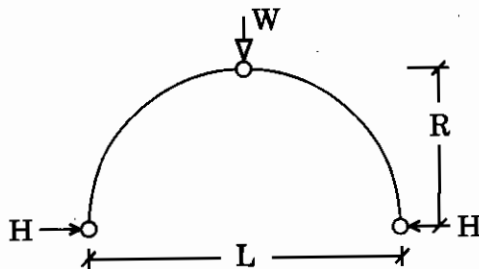
- (1) $\frac{ML}{2EI}$
- (2) $\frac{ML}{3EI}$
- (3) $\frac{ML}{4EI}$
- (4) $\frac{ML}{6EI}$

14. Carry-over factor C_{BA} for the beam shown in the figure below is



- (1) a/b
- (2) $3/4$
- (3) a/L
- (4) $1/2$

15. For a three-hinged parabolic arch, what will be the ratio L/R to satisfy $H = W$?



- (1) 0.50
- (2) 1.50
- (3) 2.00
- (4) 4.00

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16. Match the following :

a. Three-hinged arch

I. Statically indeterminate to third degree

b. Two-hinged arch

II. Statically indeterminate to first degree

c. Hingeless arch

III. Statically determinate

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

17. What is true for flexibility and stiffness matrix ?

a. They are square matrix

b. The diagonal elements are non-zero and having positive values

c. Element $ij =$ Element ji

d. They are inverse of each other

Answer Options :

(1) a and b

(2) All of the above

(3) c and d

(4) a, c, and d

18. Muller – Breslau Principle in structural analysis is used for

(1) Drawing ILD for any force function

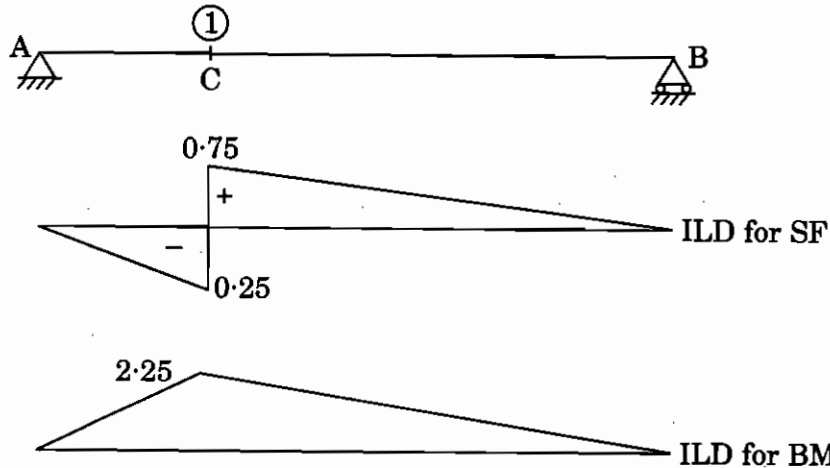
(2) Writing virtual work equation

(3) Superposition of load effects

(4) None of the above

19. The given figure shows ILD for SF and BM at section 1

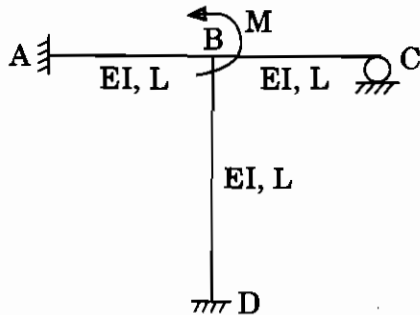
$$AC = 3 \text{ m}, \quad BC = 9 \text{ m}$$



The value of SF and BM at (1) due to concentrated load of 20 kN at mid span will be

- (1) 0.75 kN and 2.25 kN-m (2) 5 kN and 5 kN-m
 (3) 7.5 kN and 10 kN-m (4) 10 kN and 30 kN-m

20. All members of the frame shown below have the same flexural rigidity EI and length L . If a moment M is applied at joint B, the rotation of the joints is



- (1) $\frac{ML}{12EI}$ (2) $\frac{ML}{11EI}$ (3) $\frac{ML}{8EI}$ (4) $\frac{ML}{7EI}$

21. A stiffness matrix is to be generated for beam AB as horizontal flexural member. As per the method adopted for calculation of stiffness matrix, if end A is given translational displacement in vertically upward direction, the end forces generated at end 'B' are

- (1) No forces at end B
 (2) $-12 EI/L^3$ vertical force and $6EI/L^2$ moment
 (3) $-6 EI/L^2$ vertical force and $2EI/L$ moment
 (4) $-6 EI/L^2$ vertical force and $4EI/L$ moment

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22. If the stiffness matrix of beam element is given as $\frac{2EI}{L} \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$, then the flexibility matrix is

(1) $\frac{L}{6EI} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

(2) $\frac{L}{2EI} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

(3) $\frac{L}{3EI} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

(4) $\frac{L}{6EI} \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$

23. The inclination of a lacing bar with the axis of the compression member is θ . Then ' θ ' shall **not** be less than

(1) 30°

(2) 40°

(3) 50°

(4) 70°

24. A column splice is used to increase

(1) the length of the column

(2) the strength of the column

(3) the rigidity of the column

(4) the cross-sectional area of the column

25. In a cantilever plate girder to prevent web buckling, horizontal stiffeners are provided running along the span. They are provided

(1) below the neutral axis

(2) over the entire cross-section (above as well as below neutral axis)

(3) above the neutral axis

(4) None of the above

26. Number of bolts required in a bolted joint is equal to

(1) $\frac{\text{Force}}{\text{Bolt value}}$

(2) $\frac{\text{Force}}{\text{Strength of bolt in shearing}}$

(3) $\frac{\text{Force}}{\text{Strength of bolt in bearing}}$

(4) $\frac{\text{Force}}{\text{Strength of bolt in tearing}}$

27. The deflection of beams may be decreased by

(1) Increasing the depth of beam

(2) Increasing the span

(3) Decreasing the depth of beam

(4) Increasing the width of beam

34. What are the different limit states of design as per IS 456 : 2000 ?

- Limit state of failure
- Limit state of damage
- Limit state of collapse
- Limit state of serviceability

Answer Options :

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

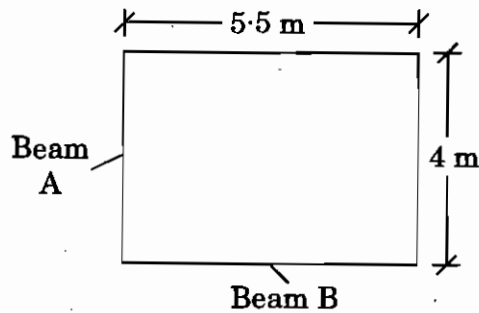
35. Maximum shear force for three equal spans of beam/slab occur at

- inner side of end support
- inner side of support next to end support
- outer side of support next to end support
- outer side of end support

36. In the design of slab, the diameter of reinforcing bars shall *not* exceed

- one-eighth of overall thickness of slab
- one-fourth of overall thickness of slab
- one-half of overall thickness of slab
- one-third of overall thickness of slab

37. Determine the slab area of which load is acting on supporting beams A and B

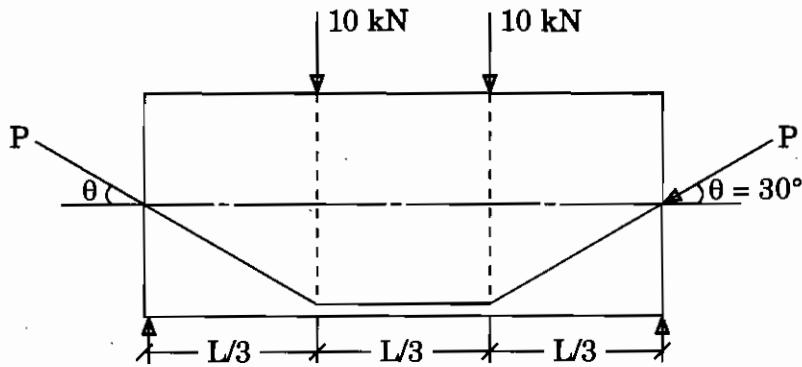


- 5.5 m^2 and 7.0 m^2
- 4.0 m^2 and 5.5 m^2
- 7.0 m^2 and 4.0 m^2
- 4.0 m^2 and 7.0 m^2

38. A Tee-beam behaves as a rectangular beam of a width equal to its flange if its neutral axis
- (1) remains within the flange
 - (2) remains below the slab
 - (3) coincides with the geometrical centre of the beam
 - (4) None of the above
-
39. According to IS 456, two-way slabs with corners held down are assumed to be divided in each direction into middle strips and edge strips such that the width of middle strip is,
- (1) half of the width of the slab
 - (2) two-third of the width of the slab
 - (3) three-fourth of the width of the slab
 - (4) four-fifth of the width of the slab
-
40. Span effective depth ratio for cantilever for span upto 10 m is
- (1) 7
 - (2) 20
 - (3) 26
 - (4) 35
-
41. Effective length of compression member which is effectively held in position and restrained against rotation at both ends is
- (1) $0.65 l$
 - (2) $0.75 l$
 - (3) $0.80 l$
 - (4) $0.85 l$
-
42. If 'H' is the total height of the building, under transient wind load the lateral sway at the top should **not** exceed
- (1) $\frac{H}{200}$
 - (2) $\frac{H}{300}$
 - (3) $\frac{H}{400}$
 - (4) $\frac{H}{500}$
-
43. An axially loaded column is 300×300 mm in size, effective length of column is 3 m. What is the minimum eccentricity of the axial load for column ?
- (1) 20 mm
 - (2) 16 mm
 - (3) 10 mm
 - (4) 0
-
44. In reinforced and plain concrete footings on soils, the thickness at the edge shall be **not** less than
- (1) 200 mm
 - (2) 150 mm
 - (3) 300 mm
 - (4) 250 mm

45. The maximum permissible final deflection of a beam should *not* exceed
- (1) span / 350 (2) span / 250
(3) span / 480 (4) span / 500
-
46. The maximum effective reinforcement ratio of a bonded prestressed concrete beam at failure according to IS : 1343 is limited to a value of
- (1) 0.15 (2) 0.40
(3) 0.25 (4) 0.50
-
47. The moment of resistance of a rectangular section depends upon
- (1) ultimate strain in concrete
(2) area of high tensile tendons
(3) tensile strength in concrete
(4) compressive stress in concrete
-
48. In case of prestressed concrete element, which statement is *not* correct ?
- (1) Concrete remains uncracked and it protects steel from corrosion.
(2) It can be used more effectively in liquid retaining structures.
(3) The stiffness of structure is less due to uncracked condition of concrete.
(4) Shear resisting capacity is increased due to pre-compression.
-
49. Prestressing force transmitted to concrete as initial internal stress to counteract the internal stress developed due to external loads is called
- (1) Stress concept
(2) Strength concept
(3) Force concept
(4) Load balancing concept

50. A simply supported beam of span 9 m is subjected to two point loads, each of 10 kN acting at $\frac{1}{3}$ of span as shown in the figure. If self-weight of beam is neglected, then how much prestressing force is required to counter-balance the external loads if $\theta = 30^\circ$?



- (1) 5 kN
 (2) 10 kN
 (3) 20 kN
 (4) 30 kN
-
51. The approximate value of shrinkage strain for design of post-tensioning member is
 Where 't' = age of concrete at transfer in days.

- (1) $\frac{0.0001}{\log_{10}(t+2)}$
 (2) 0.0003
 (3) $\frac{0.0002}{\log_{10}(t+2)}$
 (4) $\frac{0.0003}{\log_{10}(t+2)}$

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52. The partial safety factors for material strength are

- (1) 1.15 for concrete and 1.5 for steel
- (2) 1.5 for concrete and 1.15 for steel
- (3) 1.5 for both concrete and steel
- (4) 1.15 for both concrete and steel

53. A post-tensioned prestressed concrete beam is having a cross-section of 300×300 . The area of end block is 100×100 mm. Instead of 100×100 mm end block, $150 \text{ mm} \times 150 \text{ mm}$ end block is provided. What will be the reduction in bursting forces? Let the load in tendons be P_k .

- (1) $0.03 P_k$
- (2) $0.04 P_k$
- (3) $0.045 P_k$
- (4) $0.05 P_k$

54. Prestressing in a concrete beam with sloping or curve profile

- (1) increases shear strength
- (2) increases flexural strength
- (3) decreases shear strength
- (4) Both (1) and (2)

55. The bearing stress on concrete after accounting for all losses due to relaxation of steel, elastic shortening, creep of concrete, slip and seating of anchorage shall *not* exceed _____

(where, f_{ci} is the concrete strength at transfer, A_{br} is bearing area and A_{pun} is punching area)

(1) $0.16 f_{ci} \sqrt{\frac{A_{br}}{A_{pun}}}$ or $0.8 f_{ci}$ whichever is smaller

(2) $0.48 f_{ci} \sqrt{\frac{A_{br}}{A_{pun}}}$ or $0.8 f_{ci}$ whichever is smaller

(3) $0.25 f_{ci} \sqrt{\frac{A_{br}}{A_{pun}}}$ or $0.8 f_{ci}$ whichever is smaller

(4) $0.34 f_{ci} \sqrt{\frac{A_{br}}{A_{pun}}}$ or $0.8 f_{ci}$ whichever is smaller

56. The difference between EST of succeeding activity and EFT of the activity under consideration is called
- (1) Total float
 - (2) Independent float
 - (3) Interfering float
 - (4) Free float
-

57. Which of the following are the methods of scheduling ?
- (1) Bar charts or Gantt charts
 - (2) Milestone charts
 - (3) Network analysis
 - (4) All of the above
-

58. The excess of minimum available time over activity duration is called
- | | |
|-----------------------|-----------------------|
| (1) total float | (2) free float |
| (3) independent float | (4) None of the above |
-

59. Which of the following are the significant achievements of Taylor towards scientific management approach ?
- (1) Work study
 - (2) Incentive scheme
 - (3) Standardisation of tools and equipment or workman and working conditions
 - (4) All of the above
-

60. Which of the following networks is activity oriented ?
- | | |
|----------------------|-----------------------|
| (1) PERT | (2) CPM |
| (3) Both (1) and (2) | (4) None of the above |
-

61. The time required to complete an activity under abnormal or extremely adverse conditions in which everything goes wrong is called
- (1) optimistic time
 - (2) most likely time
 - (3) pessimistic time
 - (4) None of the above
-

62. What is the purpose of job layout ?

- (1) To provide more economical methods of working
 - (2) Shorter leads of materials
 - (3) Reduction in completion time
 - (4) All of the above
-

63. Which of the following codes is relevant to fire safety ?

- (1) IS 456 – 2000
 - (2) IS 1256 – 1967
 - (3) IS 800 – 1950
 - (4) None of the above
-

64. What is dummy activity ?

- (1) Activity having zero duration
 - (2) Activity shown by dotted line
 - (3) Activity which shows dependency
 - (4) All of the above
-

65. Which of the following sentences is correct ?

- (1) Except initial and end events, all events in the network are dual role events.
 - (2) All events in the network are dual role events.
 - (3) There is only one dual role event in the network.
 - (4) None of the above
-

66. PERT stands for

- (1) Perfect Evaluation and Review Technique
 - (2) Programme Elongation and Review Technique
 - (3) Programme Evaluation and Review Technique
 - (4) None of the above
-

67. Floating point form representation of a real number x is denoted by $x = f \times 10^E$ in which 'P' is called

- (1) Sign bit (2) Exponent
(3) Partial derivative (4) Mantissa

68. What will be the next approximation for finding a real root of equation

$x^3 - 2x - 5 = 0$; if it is solved using the Newton-Raphson method and initial approximation of $x = 2$?

- (1) 2.4 (2) 2.3
(3) 2.1 (4) 2.2

69. An iterative formula to find \sqrt{Y} (where Y is a positive number) by the Newton-Raphson technique is given by expression

- (1) $x_{i+1} = \frac{1}{4} \left(x_i + \frac{Y}{x_i} \right)$ (2) $x_{i+1} = \frac{1}{3} \left(x_i + \frac{Y}{x_i} \right)$
(3) $x_{i+1} = \frac{1}{2} \left(x_i + \frac{Y}{x_i} \right)$ (4) $x_{i+1} = \frac{1}{4} \left(x_i - \frac{Y}{x_i} \right)$

70. The area under straight line is an estimate of the integral of $f(x)$ between the limits a and b and the result of this integration is called trapezoidal rule. The formula used in area calculation by this rule is

- (1) $I = (a - b) \frac{f(a) + f(b)}{4}$ (2) $I = (b - a) \frac{f(b) - f(a)}{2}$
(3) $I = (b - a) \frac{f(a) + f(b)}{2}$ (4) $I = (b - a) \frac{f(a) + f(b)}{3}$

71. The method in which both sides of equations are multiplied by non-zero constant is classified as

- (1) Gaussian elimination method
(2) Gaussian inconsistent procedure
(3) Gaussian consistent procedure
(4) Gaussian substitute procedure

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72. The two segment trapezoidal rule of integration is exact for integrating at most _____ order polynomials.

- (1) first (2) second
(3) third (4) fourth

73. Division by zero during forward elimination steps in Naive Gaussian Elimination of the set of equation $[A][X] = [C]$ implies the coefficient matrix $[A]$

- (1) is invertible
(2) is non-singular
(3) may be singular or non-singular
(4) is singular

74. What will be the value of function $f(x) = x^3 + 2x - 2 = 0$ in the next iteration if $f(0) = -2$ and $f(1) = 1$?

- (1) -0.625 (2) -0.725
(3) -0.875 (4) -0.975

75. For the equation $f(x) = x^2 - x - 1 = 0$, a root lies between 1 and 2. The root of equation at second interval by bisection method is

- (1) 1.5 (2) 2
(3) 1.66 (4) 1.75

76. The root of equation $x^3 - 4x - 9 = 0$ using the bisection method is

- (1) 1.6875 (2) 2.6875
(3) 3.6875 (4) 4.6875

77. In the solution of simultaneous equations by the Gauss elimination method for solving equations, triangularization leads to

- (1) singular matrix
(2) upper triangular matrix
(3) diagonal matrix
(4) lower triangular matrix

78. Hardness of the stones can be tested by _____ in the laboratory.
- (1) Impact strength (2) Abrasion strength
(3) Mohr's scale (4) Crushing strength

79. Which of the following tests is used for measuring the workability of the concrete ?
- (1) Chloride penetration test
(2) Slump test
(3) Initial setting time test
(4) Standard consistency test

80. For aggregate ratio of order of _____, the workability is independent of the Aggregate Cement Ratio.
- (1) 1.0 (2) 1.5 (3) 2.0 (4) 3.0

81. Rankine's formula for finding the minimum depth of foundation for loose soil is

(1) $d = \frac{q}{\gamma} \left(\frac{1 + \sin \phi}{1 - \sin \phi} \right)$ (2) $d = \frac{q}{\gamma} \left(\frac{1 - \sin \phi}{1 + \sin \phi} \right)^2$
(3) $d = \frac{q}{\gamma} \left(\frac{1 - \sin \phi}{1 + \sin \phi} \right)$ (4) $d = \frac{q}{\gamma} \left(\frac{1 + \sin \phi}{1 - \sin \phi} \right)^2$

82. White lead, red lead, oxides of zinc, oxides of iron are the substances used in the formation of paints of
- (1) Vehicle (2) Drier (3) Carrier (4) Base

83. What is the name of the wooden plank or slab of concrete or stone usually provided at the bottom of an entrance door ?
- (1) Jamb (2) Reveal (3) Cornice (4) Threshold

84. In testing final setting time of cement a needle of
- (1) 1 mm square section is used
(2) 1 mm diameter is used
(3) 2 mm square section is used
(4) 5 mm square section is used

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85. Which of the following is *not* a non-destructive method of testing concrete ?
- (1) Rebound test
 - (2) Radioactive penetration method
 - (3) Soundness test
 - (4) Dynamic or vibration test
-
86. In public halls and auditoriums, the sound persists even after the source of sound has ceased. This persistence of sound is called
- (1) Absorption
 - (2) Echoes
 - (3) Reverberation
 - (4) Reflection of sound
-
87. The lime which has high calcium oxide content and is dependent for setting and hardening solely on the absorption of carbon dioxide from the atmosphere is known as
- (1) Quick lime
 - (2) Fat lime
 - (3) Hydraulic lime
 - (4) Hydrated lime
-
88. What should be the aspect for a bedroom ?
- (1) West
 - (2) North-West
 - (3) South-West
 - (4) All of the above
-
89. For roominess, length to width ratio should be
- (1) 1 : 1 to 1 : 5
 - (2) 1.2 : 1 to 1.5 : 1
 - (3) 1.5 : 1 to 2 : 1
 - (4) 1.5 : 1 to 1.75 : 1
-
90. At a point in the web of a girder the bending stress (σ_x) is 3 MPa (tensile) and the shearing stress (τ) at the same point is 2 MPa, then the maximum shear stress is
- (1) 1.5 MPa
 - (2) 4 MPa
 - (3) 2.5 MPa
 - (4) 1 MPa
-
91. A beam of length 10 m carries a uniformly distributed load of 20 KN/m over its entire length and rests on two simple supports. In order that the maximum BM produced in the beam is the least possible, the supports must be placed from the ends at a distance of
- (1) 5.86 m
 - (2) 4.14 m
 - (3) 2.93 m
 - (4) 2.07 m

92. Choose the correct relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) from the following options :

(1) $\frac{2}{E} = \frac{9}{G} + \frac{3}{K}$

(2) $\frac{9}{E} = \frac{3}{G} + \frac{1}{K}$

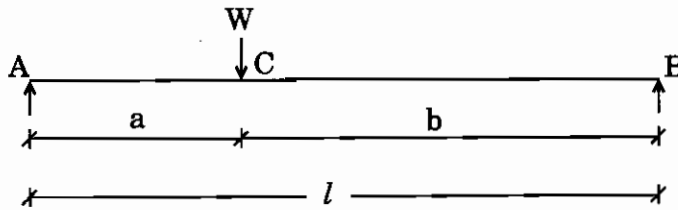
(3) $\frac{3}{E} = \frac{9}{G} + \frac{1}{K}$

(4) $\frac{1}{E} = \frac{9}{G} + \frac{3}{K}$

93. In a simple bending theory, one of the assumptions is that the material of the beam is isotropic. This assumption means that the

- (1) normal stress remains constant in all directions
- (2) normal stress varies linearly in the material
- (3) elastic constants are same in all the directions
- (4) elastic constants vary linearly in the material

94. A simply supported beam of length 'l' carries a point load 'W' at point 'C' as shown in the figure. The maximum deflection lies at



- (1) Point A
- (2) Point B
- (3) Point C
- (4) Between points B and C

95. In the torsion equation

$$\frac{T}{J} = \frac{\tau}{R} = \frac{C \cdot \theta}{l}$$

the term $\frac{J}{R}$ is called

- (1) Shear modulus
- (2) Section modulus
- (3) Polar modulus
- (4) None of the above

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96. Two solid shafts 'A' and 'B' are made of the same material. The shaft 'A' is of 50 mm diameter and shaft 'B' is of 100 mm diameter. The strength of shaft 'B' is _____ of that of shaft 'A'.

- (1) one-half (2) double
(3) four times (4) eight times

97. The shear force on a simply supported beam is proportional to

- (1) displacement of the neutral axis
(2) sum of the forces
(3) sum of the transverse forces
(4) algebraic sum of the transverse forces

98. Deflection of the free end of cantilever having point load at the mid span is

- (1) $\frac{Wl^3}{3EI}$ (2) $\frac{5Wl^3}{24EI}$
(3) $\frac{5Wl^3}{48EI}$ (4) $\frac{Wl^3}{48EI}$

99. An element in a strained body is subjected to only shear stress of intensity 50 MPa tending to rotate the body in clockwise direction. What is the magnitude of principal stresses ?

- (1) ± 50 MPa (2) + 50 MPa, - 25 MPa
(3) + 25 MPa, - 50 MPa (4) ± 25 MPa

100. Strain energy stored in a solid shaft due to application of Torque 'T' at free end while other end is fixed, if G is shear modulus, J is polar moment of inertia, and L is the length of shaft is/will be

- (1) $\frac{TL^2}{GJ}$ (2) $\frac{T^2L^2}{2GJ}$
(3) $\frac{2TL^2}{GJ}$ (4) $\frac{T^2L}{2GJ}$

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P.T.O.

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- 2018 या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम 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	3	4	4
2	#	3	4	3
3	2	1	3	3
4	2	4	4	3
5	3	1	2	1
6	4	3	3	1
7	1	1	4	3
8	1	1	2	3
9	3	4	4	4
10	3	1	1	2
11	4	2	3	2
12	1	1	4	#
13	4	2	3	2
14	1	#	3	3
15	4	3	3	2
16	2	1	1	4
17	2	3	1	4
18	1	3	3	1
19	4	2	3	3
20	2	4	4	3
21	2	4	2	2
22	1	2	2	4
23	2	4	#	2
24	1	4	2	3
25	1	3	3	4

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

Date - 28th February, 2019

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

प्रश्नपत्रिका क्र.१ (स्थापत्य अभियांत्रिकी पेपर - I)

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

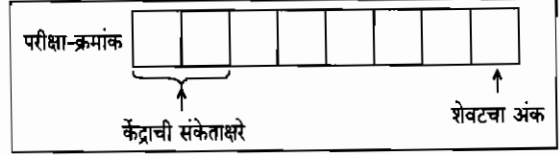
प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D
76	2	3	3	4
77	2	3	1	1
78	#	4	2	2
79	2	1	3	1
80	3	4	3	2
81	2	1	1	#
82	4	4	4	3
83	4	2	1	1
84	1	2	3	3
85	3	1	1	3
86	3	4	1	2
87	2	2	4	4
88	4	2	1	4
89	2	1	2	2
90	3	2	1	4
91	4	1	2	4
92	2	1	#	3
93	3	1	3	4
94	4	1	1	2
95	3	3	3	3
96	4	3	3	4
97	4	2	2	2
98	3	3	4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

Date -28th February, 2019

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.



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. तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.
- (2) आपला परीक्षा-क्रमांक ह्या चौकोनात 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 उत्तरांचाच 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 सूचनेविना ही सील उघडू नये

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

1. For finding out time ' t_2 ' required to achieve 50% consolidation of 1 m thick clayey strata resting on impermeable rock at bottom and sandy soil at top, a laboratory consolidation test was carried out, using 1 cm thick sample obtained from the same strata. Time " t_1 " was taken by it to achieve 25% consolidation, under double drainage condition, in the laboratory.

Choose the correct value of ratio of $\left(\frac{t_2}{t_1}\right)$ from the following :

- (1) 4,00,000 (2) 16,000 (3) 1,60,000 (4) None of the above

2. The distance 'D' between centers of piles with top diameter 'd' should **not** be less than (from practical consideration)

- (1) 2d (2) 3d (3) 4d (4) 5d

3. Match List I and List II and select the correct answer using the codes given below :

List I

(Construction Type)

- (a) Cut-off trench of a dam to be constructed across flowing river
 (b) Shallow foundation of a bridge pier
 (c) Sequential repetition of underwater foundation work
 (d) Control of groundwater to prevent entry into deep excavation

(a) (b) (c) (d)

- (1) (iv) (iii) (ii) (i)
 (2) (ii) (i) (iv) (iii)
 (3) (ii) (iii) (i) (iv)
 (4) (iii) (iv) (ii) (i)

List II

(Suitable Cofferdam Type)

- (i) Cellular sheetpile cofferdam
 (ii) Embankment type cofferdam
 (iii) Single wall sheetpile cofferdam
 (iv) Floating steel cylinder cofferdam

4. The void ratio and porosity of a soil sample having equal volume of solids and volume of voids are

- | | Void ratio | Porosity |
|-----|------------|----------|
| (1) | 1.0 | 100% |
| (2) | 0.5 | 50% |
| (3) | 1.0 | 50% |
| (4) | 0.5 | 100% |

5. Let E_2 and E_1 represent compaction energy deployed for compacting soil as per modified compaction test and standard compaction test, as per IS.

Choose from the following correct ratio of $\left(\frac{E_2}{E_1}\right)$:

- (1) About $4\frac{1}{2}$ times (2) About $3\frac{1}{2}$ times
(3) About 2 times (4) None of the above
-

6. On the same soil sample, both Standard and Modified Proctor compaction tests are conducted in the laboratory. The values of Optimum Moisture Content (OMC) and Maximum Dry Density (MDD) for modified test compared to those for standard compaction test will respectively

- (1) Increase, Increase (2) Decrease, Increase
(3) Increase, Decrease (4) No change, Increase
-

7. If the permeability, shrinkage and swelling of a compacted soil having same density on dry side of optimum moisture content is compared with compaction on wet side of optimum, the variation in these properties will be

- (1) more, less, higher (2) more, more, higher
(3) more, more, less (4) less, less, higher
-

8. An embankment has a slope of 30° which was constructed with soil having $C = 30 \text{ kN/m}^2$, $\phi = 20^\circ$ and $\gamma = 15 \text{ kN/m}^3$. The height of embankment is 20 m. Using Taylor's stability no. $\frac{1}{40}$, the factor of safety with respect to cohesion is

- (1) 0.25 (2) 2
(3) 4 (4) 1.5
-

9. The degree of consolidation depends upon

- (1) thickness of clay layer
(2) coefficient of permeability
(3) co-efficient of consolidation
(4) All the above
-

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

10. The loss of head due to sudden expansion of a pipe is given by

(1) $h_L = \frac{V_1^2 - V_2^2}{2g}$

(2) $h_L = \frac{0.5 V^2}{2g}$

(3) $h_L = \frac{(V_1 - V_2)^2}{2g}$

(4) None of the above

11. Bernoulli's equation is derived making assumption that

- (1) the flow is uniform and incompressible
- (2) the flow is non-viscous, uniform and steady
- (3) the flow is steady, non-viscous, incompressible and irrotational
- (4) None of the above

12. For the laminar flow through a circular pipe

- (1) the maximum velocity = 1.5 times the average velocity
- (2) the maximum velocity = 2.0 times the average velocity
- (3) the maximum velocity = 2.5 times the average velocity
- (4) None of the above

13. Depth at which specific energy is minimum is known as

- (1) Critical depth
- (2) Conjugate depth
- (3) Alternate depth
- (4) Normal depth

14. In a rectangular channel section, if the channel depth is 2.0 m, the specific energy at critical depth is

- (1) 3.0 m
- (2) 1.33 m
- (3) 2.5 m
- (4) 1.5 m

15. Which of the following statements is correct ?

- (1) Centrifugal pumps convert mechanical energy into hydraulic energy by thrust of piston
- (2) Reciprocating pumps convert mechanical energy into hydraulic energy by means of centrifugal forces
- (3) Centrifugal pumps convert mechanical energy into hydraulic energy by means of centrifugal force
- (4) Reciprocating pumps convert hydraulic energy into mechanical energy

16. Dynamic viscosity (μ) has the dimensions as

- (1) MLT^{-2} (2) $ML^{-1}T^{-1}$ (3) $ML^{-1}T^{-2}$ (4) $M^{-1}L^{-1}T^{-1}$

17. The submerged body will be in stable equilibrium if

- (1) The centre of buoyancy B is below the centre of gravity G
 (2) The centre of buoyancy B coincides with G
 (3) The centre of buoyancy B is above the metacentre M
 (4) The centre of buoyancy B is above G

18. Continuity equation deals with the law of conservation of

- (1) mass (2) momentum
 (3) energy (4) None of the above

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

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

where A = cross-sectional area of cylinder or piston

L = length of stroke

N = r.p.m. of the crank

20. 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

21. During suction stroke of a reciprocating pump, the separation may take place

- (1) at the end of suction stroke
 (2) in the middle of suction stroke
 (3) at the beginning of suction stroke
 (4) None of the above

22. 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) $N_s = \frac{N\sqrt{P}}{H_m^{5/4}}$

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23. Kaplan turbine is a/an
- (1) impulse turbine (2) radial flow impulse turbine
(3) axial flow reaction turbine (4) radial flow reaction turbine
-
24. A turbine is a device which converts
- (1) Hydraulic energy into mechanical energy
(2) Mechanical energy into hydraulic energy
(3) Kinetic energy into mechanical energy
(4) Electrical energy into mechanical energy
-
25. In the inlet part of the jet impinging on a Pelton bucket, the velocity of whirl V_{w1} is equal to
- (1) absolute velocity of jet at inlet V_1 (2) relative velocity of jet at inlet V_{r1}
(3) zero (4) None of the above
-
26. If the turbine has kinetic energy and pressure energy of water at its inlet, then such turbine is known as
- (1) impulse turbine (2) reaction turbine
(3) Pelton wheel turbine (4) low head turbine
-
27. Which component is *not* provided to Pelton wheel turbine ?
- (1) Penstock (2) Jet (3) Casing (4) Draft tube
-
28. The artesian aquifer is one where
- (1) water surface under the ground is at atmospheric pressure
(2) water table serves as upper surface of zone of saturation
(3) water is under pressure between two impervious strata
(4) None of the above
-
29. Lysimeter is used to measure
- (1) Infiltration (2) Evaporation
(3) Evapotranspiration (4) Vapour pressure
-
30. Horton's infiltration capacity is given as
- (1) $f = f_o + [f_c - f_o] e^{-kt}$ (2) $f = f_o - [f_c + f_o] e^{-kt}$
(3) $f = f_o - [f_c - f_o] e^{-kt}$ (4) $f = f_c + [f_o - f_c] e^{-kt}$

31. Weibull formula is

$$(1) P = \left(\frac{m}{N+1} \right)$$

$$(2) P = \left(\frac{m}{N-1} \right)$$

$$(3) P = \left(\frac{N+1}{m} \right)$$

$$(4) P = \left(\frac{N-1}{m} \right)$$

(where m is order number and N is number of years of record)

32. The term base flow denotes

- (1) delayed groundwater flow reaching a stream
- (2) delayed groundwater and snowmelt reaching a stream
- (3) delayed groundwater and interflow
- (4) the annual minimum flow in a stream

33. Following is *not* the method of apportionment of total cost of multipurpose reservoir :

- | | |
|------------------------------|------------------------------|
| (1) Remaining benefit method | (2) Use of facilities method |
| (3) Equal apportionment | (4) Direct method |

34. Owing to the storage effect, the peak of the outflow hydrograph will be smaller than that of the inflow hydrograph. This reduction in peak value is known as

- | | |
|-------------|-------------------|
| (1) Lag | (2) Attenuation |
| (3) Routing | (4) Prism storage |

35. An IUH is a direct runoff hydrograph

- (1) of one cm magnitude due to rainfall excess of 1-h duration
- (2) that occurs instantaneously due to a rainfall excess of 1-h duration
- (3) of unit rainfall excess precipitating instantaneously over the catchment
- (4) occurring at any instant in long duration

36. The example of aquifuge is

- | | |
|-------------------------|----------------------|
| (1) Clay layer | (2) Sandy layer |
| (3) Solid granite rocks | (4) Silty clay layer |

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37. The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in the field is
(1) Water conveyance efficiency (2) Water application efficiency
(3) Water use efficiency (4) None of the above
-
38. In border strip method of irrigation, the width of strip is
(1) 5 – 10 m (2) 10 – 20 m (3) 20 – 30 m (4) 25 – 30 m
-
39. The duty of irrigation water for a given crop is maximum
(1) on the field (2) at the head of main canal
(3) at the head of water course (4) near the distributary
-
40. A channel designed by Lacey's theory has a mean velocity of one m/s. The silt factor is unity. The hydraulic mean radius will be
(1) 2.5 m (2) 2.0 m (3) 1.0 m (4) 0.5 m
-
41. In design of spillway when $H_e = H_d$, the value of 'C' is
(1) 1.00 (2) 1.33 (3) 2.00 (4) 2.20
-
42. Hygroscopic water is defined as the
(1) readily available water for the use of plants.
(2) water which is adsorbed by the particles of the dry soil from the atmosphere.
(3) total water content of the soil when all pores are filled with water.
(4) water held by the soil under capillary action.
-
43. In case of non-availability of space due to topography, the most suitable spillway is
(1) Straight drop spillway (2) Shaft spillway
(3) Chute spillway (4) Ogee spillway
-
44. The channel after obtaining its section and longitudinal slope will be said to be in
(1) Initial regime (2) Permanent regime
(3) Final regime (4) Absolute regime
-
45. The silt load in the stream does *not* depend upon
(1) nature of the soil in the catchment area
(2) topography of the catchment area
(3) intensity of rainfall
(4) alignment of dam

46. Match the design speed recommended for various roads by IRC 86 : 1983

List I

- (a) Collector roads
 (b) Local roads
 (c) Arterial roads
 (d) Sub-arterial roads

List II

- (i) 30 kmph
 (ii) 80 kmph
 (iii) 60 kmph
 (iv) 50 kmph

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

47. IRC recommended % values of camber for different types of road surface can be arranged in descending order of following roads :

- a. Water bound macadam road
 b. Thin bituminous surface road
 c. Cement-concrete road
 d. Earth road

Answer Options :

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

48. The expression for the length of a transition curve (L_s) in meters is

- | | |
|-------------------------------|---------------------------------|
| (1) $L_s = \frac{V^3}{CR}$ | (2) $L_s = \frac{V^3}{16 CR}$ |
| (3) $L_s = \frac{V^3}{24 CR}$ | (4) $L_s = \frac{V^3}{46.5 CR}$ |

where

C = Rate of change of radial acceleration in m/s^3

R = Radius of the circular curve in metres, and

V = Speed of vehicle in kmph

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49. The design speed adopted for design of rotaries in urban areas of India is
 (1) 30 kmph (2) 40 kmph (3) 50 kmph (4) 60 kmph

50. Match the following :

List I		List II	
(a) Stop signs		(i) Circular in shape	
(b) Give way signs		(ii) Equilateral triangle with its apex pointing upwards	
(c) Speed limit signs		(iii) Octagonal shape	
(d) Warning signs		(iv) Inverted triangle with its apex pointing downwards	
(a)	(b)	(c)	(d)
(1) (i)	(ii)	(iii)	(iv)
(2) (ii)	(i)	(iii)	(iv)
(3) (iii)	(iv)	(i)	(ii)
(4) (iv)	(iii)	(ii)	(i)

51. The dowel bars are used in rigid pavements for
 (1) resisting tensile stresses
 (2) resisting bending stresses
 (3) resisting shear stresses
 (4) transferring load from one portion to another

52. Group index method of designing flexible pavement is based on
 a. Plasticity index
 b. Shear strength
 c. CBR value
 d. Percent fines

Answer Options :

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

53. Grade separation
 a. is for crossing traffic
 b. is to minimize delay and hazard
 c. a cheaper option
 d. increases discomfort and inconvenience
 (1) a and c (2) b and c (3) a and b (4) c and d

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P.T.O.

54. Consider the following statements :

Collision diagram is used to

- | | |
|--------------------------------|---|
| a. study accident patterns | b. eliminate accidents |
| c. determine remedial measures | d. make statistical analysis of accidents |

Answer Options :

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

55. A bridge has a linear waterway of 150 metres constructed across a stream whose natural linear waterway is 200 metres. If the average flood depth is 3 metres and average flood discharge is 1200 m³/sec, the velocity of approach is

- (1) 2.0 m/sec (2) 2.66 m/sec (3) 6.0 m/sec (4) 8.0 m/sec

56. The width of carriageway required will depend on the intensity and volume of traffic anticipated to use the bridge.

- Except on minor village roads all bridges must provide for at least two lane width
- The minimum width of carriageway is 4.25 m for one lane bridge
- The minimum width of carriageway is 3.75 m for one lane bridge
- The minimum width of carriageway is 7.5 m for two lane bridge

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

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

57. Which of the following shall be considered while designing high level bridges for buoyancy effect ?

- Full buoyancy for the superstructure
- Full buoyancy for the abutments
- Buoyancy forces due to submerged part of the substructure and foundation
- Partial buoyancy for superstructure

58. The normal depth of scour for alluvial rivers is determined by Lacey's formula

- | | |
|---|--|
| (1) $\sqrt{0.475} \left(\frac{f}{Q} \right)$ | (2) $0.475 \left(\frac{Q}{f} \right)^3$ |
| (3) $0.475^3 \sqrt{\frac{f}{Q}}$ | (4) $0.475^3 \sqrt{\frac{Q}{f}}$ |

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59. Roller bearings are used in bridges for the span of
 (1) 18 to 24 m (2) 12 to 18 m (3) 6 to 12 m (4) Up to 6 m
-
60. The maximum scour depth dm for condition of flow at noses of piers is
 (1) $1.50 d$ (2) $1.75 d$ (3) $2.00 d$ (4) $2.75 d$
-
61. For high level bridges, the freeboard should **not** be less than
 (1) 200 mm (2) 400 mm (3) 600 mm (4) 800 mm
-
62. As per IRC specifications, the minimum cement content in concrete is _____ for major bridges.
 (1) 340 kg/m^3 (2) 350 kg/m^3
 (3) 360 kg/m^3 (4) 370 kg/m^3
-
63. For IRC class A and B loading, the impact factor, for R.C.C. bridges having spans more than 45 metres, is taken as
 (1) 0.078 (2) 0.088 (3) 0.098 (4) 0.154
-
64. Which pattern of the drilling is **not** used for shafts ?
 (1) Central wedge cut (2) End wedge cut
 (3) Vertical wedge cut (4) Alternate wedge cut
-
65. From the economy point of view, tunnelling is advisable when the depth of open cut is more than
 (1) 6 m (2) 12 m (3) 18 m (4) 24 m
-
66. Match the following :
- | List I | | List II | |
|----------------------------|--|--|--|
| (a) Firm ground | | (i) Needing instant support all round | |
| (b) Running ground | | (ii) Needing instant support for roof | |
| (c) Self-supporting ground | | (iii) No need of instant support for roof | |
| (d) Soft ground | | (iv) Soil stands supported for short period and short length | |
- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (i) | (ii) | (iii) | (iv) |
| (2) | (iv) | (ii) | (i) | (iii) |
| (3) | (iii) | (i) | (iv) | (ii) |
| (4) | (iv) | (iii) | (ii) | (i) |

67. Which of the following methods is suitable for the construction of large-sized railway or highway tunnels ?

- | | |
|-----------------------|----------------------|
| (1) Forepoling method | (2) American method |
| (3) Case method | (4) Full face method |

68. Match the List I (Shape of Tunnel) with List II (Characteristics) :

List I				List II			
(a)	Circular section			(i)	Provides more working space		
(b)	Horseshoe section			(ii)	Provides greatest cross-sectional area for least perimeter		
(c)	Egg shape			(iii)	Vertical sides with flat floor		
(d)	Segmental cross-section			(iv)	Provides least cross-section area at the bottom		
	(a)	(b)	(c)	(d)			
(1)	(ii)	(i)	(iv)	(iii)			
(2)	(i)	(ii)	(iii)	(iv)			
(3)	(iii)	(iv)	(i)	(ii)			
(4)	(iv)	(iii)	(ii)	(i)			

69. In order to maintain the desired shape of the tunnel, the cross section of the tunnel must be checked at a regular interval of

- (1) 2 m to 3 m (2) 4 m to 6 m (3) 5 m to 7 m (4) 8 m to 15 m

70. *Assertion (A)* : Faces for attacking the excavation and construction of tunnels are opened by constructing pilot tunnels.

Reasoning (R) : Pilot tunnels are suitable at locations when horizontal approach to the centre line of tunnel is shorter than deep vertical shafts.

- (1) Both (A) and (R) are true and (R) is the correct explanation of A
 (2) (A) is true and (R) is false
 (3) (A) is false and (R) is true
 (4) Both (A) and (R) are false

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71. Which of the following methods is generally considered the most efficient system for ventilation of tunnels ?

- (1) Driving a shaft through the tunnel
- (2) Driving a drift through the top portion
- (3) Blow in method
- (4) Combination of blowing and exhausting

72. In case of long tunnels, the drainage system consists of sump wells which are located at regular intervals of about

- | | |
|--------------------|--------------------|
| (1) 50 m to 100 m | (2) 100 m to 200 m |
| (3) 200 m to 300 m | (4) 300 m to 500 m |

73. Air valves or Air-relief valves are provided at

- | | |
|----------------|-----------------------|
| (1) Summits | (2) Valleys |
| (3) All joints | (4) None of the above |

74. Which of the following treatments reduces salinity of water ?

- a. Alum coagulation, flocculation and settling
- b. Carbon filtration
- c. Reverse osmosis
- d. Electro dialysis

Answer Options :

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

75. The minimum velocity of flow in a sewer should be ideally

- (1) equal to self-cleansing velocity
- (2) equal to non-scouring velocity
- (3) less than self-cleansing velocity
- (4) more than non-scouring velocity

76. Sewer lines having difference of more than 600 mm in the water lines and invert level of two sewers are connected with a

- | | |
|------------------------|------------------|
| (1) Siphon | (2) Manhole |
| (3) Inspection chamber | (4) Drop manhole |
-

77. Generally the period chosen for a standard B.O.D. test is

- | | |
|------------|-------------|
| (1) 1 day | (2) 5 days |
| (3) 8 days | (4) 20 days |
-

78. For rapid sand filter, sand should have the following specifications :

- (1) Effective size 0.1 – 0.5 mm
Uniformity co-efficient = 2 to 4
 - (2) Effective size 0.2 – 0.5 mm
Uniformity co-efficient = 2 to 3
 - (3) Effective size 0.45 – 0.7 mm
Uniformity co-efficient = 1.3 to 1.7
 - (4) Effective size 0.7 – 0.9 mm
Uniformity co-efficient = 1 to 5
-

79. If waste water is disposed off into a natural stream, the maximum dissolved oxygen depletion occurs in the zone of

- | | |
|-------------------|--------------------------|
| (1) degradation | (2) active decomposition |
| (3) clearer water | (4) recovery |
-

80. In a sedimentation tank design, surface overflow rate (S.O.R.) is calculated as

- (1) Surface area/velocity of water $Q/V/V$
 - (2) Discharge/plan area $Q/B \times L$
 - (3) Volume of tank/discharge V/Q
 - (4) Surface area/settling velocity of the particle A/V_s
-

81. The waste water treatment unit which is installed to remove floating substances like grease, oil, fats, waxes, etc. is

- | | |
|------------------------|-----------------------|
| (1) skimming tank | (2) detritus tank |
| (3) sedimentation tank | (4) None of the above |
-

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82. An alidade in which one edge is bevelled is called as
- (1) Soft edge (2) Fiducial edge
(3) Telescopic edge (4) Swivel edge
-
83. Contour interval is the
- (1) vertical distance between two consecutive contours
(2) horizontal distance between two consecutive contours
(3) vertical distance between two points on the same contour
(4) horizontal distance between two points on the same contour
-
84. The length of a simple circular curve of radices R metres and intersection angle D degrees will be
- (1) $R \cdot \frac{D}{2}$ (2) $\frac{\pi}{180} \cdot R \cdot \frac{D}{2}$
(3) $\frac{\pi}{180} \cdot R \cdot \frac{D}{4}$ (4) $\frac{\pi}{180} \cdot R \cdot D$
-
85. The height of an instrument is the
- (1) Height of the instrument above the ground
(2) Height between ground and telescope
(3) Elevation of the plane of sight
(4) Reduced level of station
-
86. If a tachometer is fitted with an anallactic lens, then,
- (1) Additive constant is 100 and multiplying constant is zero
(2) Multiplying constant is 100 and additive constant is zero
(3) Both additive and multiplying constants are 100
(4) Both multiplying and additive constants are 50
-
87. Following is constant for a contour map :
- (1) Horizontal equivalent
(2) Benchmark
(3) Contour interval
(4) Topography

88. The combined correction due to curvature and refraction is given by
- (1) $0.095 d^2$ (2) $0.01122 d^2$
 (3) $0.06735 d^2$ (4) $0.572 d^2$
 (where d is in km)

89. Reiteration method is also called as
- (1) Method of series (2) Repetition method
 (3) Direction method (4) Both (1) and (3)

90. The expression for sensitivity of the bubble tube (α) can be taken as, _____

where n = No. of divisions

s = Net staff reading

d = Distance

R = Radius of curvature

l = Length of one division

- (1) $\alpha = \frac{s}{nd} \times 206265$ seconds (2) $\alpha = \frac{d}{ns} \times 206265$ seconds
 (3) $\alpha = \frac{n/D}{R}$ radians (4) $\alpha = \frac{s}{nR} \cdot \frac{l}{D}$

91. Closing error in theodolite traverse survey is given as

- (1) $e = \sqrt{(\sum L^2 + \sum D^2)^2}$ (2) $e = \sqrt{(\sum L)^2 + (\sum D)^2}$
 (3) $e = \sqrt{\sum L + \sum D}$ (4) $e = \sqrt{(\sum L)^2 - (\sum D)^2}$

92. If the length of 16 mm diameter bar is 10 m, then its weight is

- (1) 16.5 kg (2) 16.9 kg
 (3) 15.8 kg (4) 16.2 kg

93. Security deposit is

- (1) deposited at the time of filling tender
 (2) deposited by the contractor whose tender is accepted
 (3) deposited at the time of opening tenders
 (4) deposited for fair competition

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94. In order to compute the quantities of R.C.C. beams, lengths of beams are measured to the
- (1) nearest millimetre (2) nearest half centimetre
(3) nearest centimetre (4) nearest inch
-
95. In case of which type of contract, unbalanced tender is *not* possible ?
- (1) Open tender (2) Item rate contract
(3) Percentage rate contract (4) Unit price contract
-
96. Which of the following types of contract is used for execution of large works financed by public bodies or the government ?
- (1) Item rate contract (2) Percentage rate contract
(3) Cost plus type contract (4) Target contract
-
97. *Assertion (A)* : Earnest money deposit is usually 1% to 2% of the total estimated cost of the work.
Reasoning (R) : Earnest money deposit prevents unnecessary and unhealthy competition.
- (1) Both (A) and (R) are true (2) Both (A) and (R) are false
(3) (A) is true and (R) is false (4) (A) is false and (R) is true
-
98. Equation for cement requirement in tonnes for four-storey R.C.C. framed building (super structure) recommended by C.B.R.I. is
- (1) $0.153 A + 0.57$ (2) $0.145 A + 0.54$
(3) $0.182 A - 0.35$ (4) $2.26 A + 66.8$
(where A is plinth area in sq. mt)
-
99. While submitting tender by three envelope method, which envelope contains rates/amount offered by the tenderer ?
- (1) Envelop : 3 (2) Envelope nos : 1 and 2
(3) Envelope : 1 (4) None of the above
-
100. The length of L-bend for Tor steel to be provided at each end of the reinforcing bars is
- (1) 12 times diameter (2) 6 times diameter
(3) 3 times diameter (4) 150 mm

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 कापी 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- 2018 या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम 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	2	3
2	2	3	2	3
3	2	2	1	4
4	3	1	1	1
5	1	#	4	3
6	2	3	2	4
7	1	2	2	3
8	3	4	3	3
9	4	1	4	2
10	3	1	3	1
11	3	1	3	3
12	2	3	4	3
13	1	3	1	#
14	#	3	3	1
15	3	1	4	3
16	2	1	3	3
17	4	2	3	3
18	1	4	2	2
19	1	3	1	3
20	1	3	3	3
21	3	4	3	3
22	3	1	#	2
23	3	#	1	1
24	1	4	3	4
25	1	2	3	1

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

प्रश्नपत्रिका क्र. २ (स्थापत्य) अभियांत्रिकी पेपर - II)

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

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

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.