PART - I

Paper Code
03
Subject
Civil Engg. - I

201070

PART - II

Subject : Civil Engg. -I

201070

Paper Code:	03
Total Pages :	
Time	3 Hours
Maximum Marks :	200

TO BE FILLED BY THE CANDIDATE

Roll No. (In words)	
Name of the candidate	
Date of Birth (DD/MM/YYYY)	
Father's Name	
Signature of the candidate	
Date of Examination	

Roll No.

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Invigilator must check the Roll No. and Photo ID. of the candidate, then Sign. here :

TO BE FILLED BY INVIGILATOR

If candidate found using unfair means them Invigilator should fill up this bubble with black/blue ball pen & report to the Centre Superintendent:

IMPORTANT NOTES
महत्त्वपूर्ण निर्देश

(A) Please fill up the OMR Sheet of this Question-Answer Booklet properly before answering.
प्रश्नोत्तर पुस्तिका में प्रश्न हल करने से पूर्व उसके संलग्न ओ.एम.आर. पत्रक को भली प्रकार से भर लें ।

(B) The question paper is divided into different unit and parts. The number of questions to be attempted and their marks are indicated in each unit and parts.
प्रश्न-पत्र विभिन्न यूनिट एवं भागों में विभाजित है । प्रत्येक यूनिट एवं भाग में से किये जाने वाले प्रश्नों की संख्या और उनके अंक उस यूनिट एवं भाग में अंकित किये गए हैं ।

(C) Attempt answers either in **Hindi or English**, not in both. For Language Papers, answer in concerned language and script, unless directed otherwise to write in Hindi or English specifically.
उत्तर **अंग्रेजी या हिन्दी** भाषा में से किसी एक में दीजिये, दोनों में नहीं । भाषा विषयक प्रश्नों के उत्तर उनकी संबद्ध भाषा व लिपि में ही दिए जाएँ, जब तक कि प्रश्न विशेष के लिए अलग से हिंदी या अंग्रेजी में उत्तर देने के लिए न लिखा गया हो ।

(D) The candidates should not write the answers beyond the prescribed limit of words; failing this, marks will be deducted.
अभ्यर्थियों को अपने उत्तर निर्धारित शब्दों की सीमा से अधिक नहीं लिखना चाहिए । इसका उल्लंघन करने पर अंक काटे जायेंगे ।

(E) Please write answers only in the prescribed space of booklet. Do not write any mark of identity inside the Answer Script (including Paper for rough work) i.e. name, address, telephone number, Name of God etc. or any irrelevant words other than the answer of question. Such act will be treated as unfair means. The Commission may also deduct 5 marks from the marks obtained, if Roll Number is not filled correctly on the O.M.R. Sheet.
किसी भी प्रश्न का उत्तर प्रश्नोत्तर पुस्तिका में निर्धारित स्थान पर ही लिखें । प्रश्नोत्तर पुस्तिका (रफ़ कार्य के पृष्ठ सहित) के अंदर कहीं पर भी अपना नाम, रोल नंबर अथवा अन्य कोई पहचान चिह्न यथा -- प्रश्नोत्तर में नाम, पता, दूरभाष नंबर, देवताओं के नाम अथवा अन्य कोई भी प्रश्नोत्तर से असम्बंधित शब्द, वाक्य एवं अंक आदि न लिखें । ऐसा करने पर आयोग द्वारा इसे अनुचित साधन अपनाने का कृत्य माना जायेगा । ओ.एम.आर. पत्रक पर रोल नम्बर का त्रुटिपूर्ण अंकन करने पर आयोग द्वारा उसके प्राप्तांकों में से 5 अंक भी काटे जा सकते हैं ।

(F) Candidates are directed that they should not write (answer) out side the border line in every page. Answer written out side the border line will not be checked by the Examiner.
अभ्यर्थियों को निर्देशित किया जाता है कि प्रश्नोत्तर पुस्तिका में प्रत्येक पृष्ट में बनाई गई बार्डर लाईन से बाहर प्रत्युत्तर नहीं लिखें । बार्डर लाईन के बाहर लिखे गये उत्तर को परीक्षक द्वारा जाँचा नहीं जायेगा ।

(G) If there is any sort of ambiguity/mistake either of printing or factual nature then out of Hindi and English version of the question, the English version will be treated as standard.
यदि किसी प्रश्न में किसी प्रकार की कोई मुद्रण या तथ्यात्मक प्रकार की त्रुटि हो तो प्रश्न के हिन्दी तथा अंग्रेजी रूपान्तरों में से अंग्रेजी रूपान्तर मान्य होगा ।

(H) It should be ensured that the Question-Answer Booklet is provided in a sealed envelope to the candidate.
अभ्यर्थी यह सुनिश्चित कर लें कि अभ्यर्थी को प्रश्नोत्तर पुस्तिका सीलबंद लिफाफे में प्रदान की गई है ।

(I) Candidate should fill up all desired details on this attached OMR sheet of Question-Answer Booklet with **blue** ball point pen. Please ensure that this OMR Sheet is not torn or damaged.
अभ्यर्थी प्रश्नोत्तर पुस्तिका के ऊपर संलग्न इस ओ.एम.आर. पत्रक पर सभी वांछित विवरण **नीले** बॉल पेन से सावधानीपूर्वक भरें । ध्यान रखें कि यह ओ.एम.आर. पत्रक कहीं से कटे-फ़टे नहीं अथवा किसी भी प्रकार से क्षतिग्रस्त नहीं हो ।

(J) This **OMR** Sheet consists of **Two** parts, in which some information is pre-printed; remaining details have to be filled by the candidate.
यह **ओ.एम.आर**. पत्रक **दो** भागों में बंटा है, जिसमें कतिपय सूचनाएँ पूर्वमुद्रित हैं । शेष की पूर्ति अभ्यर्थी को करनी है ।

(K) If the Question-Answer Booklet is torn or not printed properly, bring it to notice of invigilator and change the Question-Answer booklet, otherwise the candidate will be liable for that.
यदि प्रश्नोत्तर पुस्तिका कहीं से कटी-फटी या अमुद्रित है, तो अभिजागर के ध्यान में ला दें तथा उसे बदलवा ले, अन्यथा उसका दायित्व अभ्यर्थी का होगा ।

विशेष नोट :

अभ्यर्थी द्वारा यदि ओ.एम.आर. पत्रक पर गलत सूचना भरी जाती है या उसे किसी प्रकार की क्षति पहुँचाई जाती है अथवा उस पर किसी प्रकार का पहचान चिह्न अंकित किया जाता है, तो आयोग द्वारा संपूर्ण परीक्षा हेतु अभ्यर्थिता निरस्त की जा सकेगी और उसके लिए अभ्यर्थी उत्तरदायी होगा ।

Special Notes :

If there is any wrong information filled by the candidate or any attempt is made to damage it or any marking as identification is done, then his candidature for the entire examination shall be rejected by the commission, for which he will be liable.

SPACE FOR ROUGH WORK

Paper – I
CIVIL ENGINEERING – I

(Total 200 Marks)
(Total 38 Question)

PART – A

Marks : 40

Note : Attempt **all** questions. Answer the following questions in **15** words each. Each question carries **2** marks.

1. Calculate the total cross-sectional area of minimum shear reinforcement in limit state design for a reinforced concrete beam of width 350 mm and total depth 700 mm as per IS : 456-2000, if the steel grade is Fe 415 and concrete grade is M35. 10 mm diameter 2 legged stirrups are provided at a spacing of 300 mm centre to centre as shear reinforcement.

2. What is pure bending ?

3. Define the distribution factor of moment distribution method.

4. Calculate the minimum area of tensile reinforcement required in limit state design as per IS : 456-2000 for a reinforced concrete beam having 300 mm width and 450 mm effective depth. The beam is subjected to an all inclusive uniformly distributed load of 20 kN/m. Concrete grade M30 and steel grade Fe 500.

5. Enlist types of losses of prestress in pretensioning.

6. Calculate the area of steel base of an isolated grillage foundation of a steel column carrying an axial load of 2000 kN. Self weight of column and foundation is 200 kN and foundation is resting on soil having safe bearing capacity of 110 kN/m^2.

7. Define the development length in RCC.

8. Define the Purlins.

9. Explain throat thickness and effective length of the fillet weld.

10. Name the main factors/parameters on which pile group efficiency depends.

11. Define pressure bulb in soil.

12. Define shear strength of soil and give expression of Coulomb equation.

13. Determine the intensity of passive lateral earth pressure in kN/m^2 at a depth of 5 m for a cohesionless soil deposit having a unit weight of 18 kN/m^3 and angle of internal friction of 30°.

14. Define coefficient of permeability of soil.

15. Determine the magnitude of bending moment at 1 m from the left end of a simply supported beam AB of effective length 4 m and subjected to an anticlockwise moment of 40 kNm at the centre of beam.

16. What is kinematic indeterminacy ?

17. Differentiate between normal stress and shear stress.

18. Give the values of partial factor of safety for Concrete & Steel.

19. Define the load balancing concept of prestress concrete.

20. For the beam shown in Fig. given below, calculate the load required at C to produce deflection of 10 mm at A and 4 mm at B. The deflection produced at C is 5 mm.

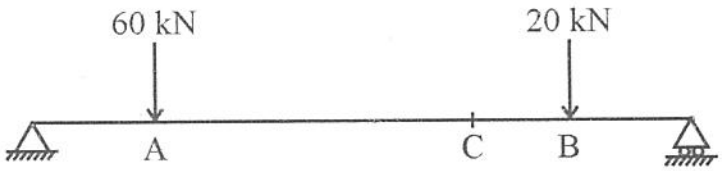

Fig.

PART – B

Marks : 60

Note : Answer all the following questions in **50** words each. Each question carries **5** marks.

21. Why do we design a RCC column for minimum eccentricity ?

22. Briefly discuss two limit states which are considered for the design of steel structures.

23. A rectangular prestressed concrete beam (300 mm × 600 mm) is prestressed by 6 Nos. High tensile steel wires of 16 mm (dia.), effective stress 1,600 MPa located at 150 mm from the soffit of the beam. Without having any tension in the beam, find the maximum moment that can be applied.

24. A steel plate 160 mm × 10 mm is connected to a gusset plate by fillet weld of size 5 mm at site. If the plate is to resist a factored tensile load of 350 kN, steel grade is Fe 410 and welding is done on all four sides of the plate, calculate the required overlap of plate on gusset plate (overlap rounded off to nearest 10 mm) in limit state design as per IS : 800-2007.

25. Write a note on five important factors affecting the permeability of soil.

26. A beam of square cross section is laid along one of its sides. The beam is then rotated such that one of its diagonal becomes horizontal. What is the percentage increase or decrease in the moment capacity of the beam if the permissible stress in bending remains constant ?

27. Write the assumptions on which the Euler's theory of columns is based.

28. State the generalized reciprocal theorem or the Betti's theorem.

29. Using unit load method, determine the deflection at the free end of the cantilever beam shown in Fig. given below.

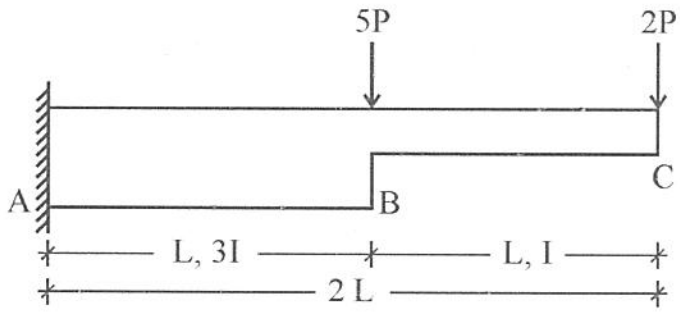

Fig.

30. Explain shear lag effect in beams.

31. Determine the percentage loss of prestress due to anchorage slip of 2 mm in a prestressed concrete beam of length 20 m. The beam is post tensioned with a steel cable having an initial stress of 1000 N/mm^2 and modulus of elasticity of steel is 2×10^5 N/mm^2.

32. What is negative skin friction in pile design ? Mention two conditions in which negative skin friction will develop.

PART – C

Marks : 100

Note : Answer **five** of the following questions in **200** words. The question carries **20** marks.

33. A single angle section ISA 100 mm × 75 mm × 10 mm is used as a tie member in a roof truss. Its 100 mm leg is connected to a 12 mm thick gusset plate by means of one line of 24 mm diameter bolts of grade 8.8. Determine the ultimate tensile strength of the tension member due to gross section yielding and net section rupture in limit state design as per IS : 800-2007 if steel grade is Fe 410. The shear lag factor can be taken as 0.7. The curvature at edges of the angle can be neglected to calculate area.

34. A singly reinforced beam of width 400 mm and effective depth 600 mm is reinforced with 5 bars of 20 mm diameter as tension reinforcement. There are 8 mm diameter 2 legged stirrups provided @ 200 mm c/c. Concrete grade M 25, Steel grade Fe 415. Calculate the ultimate moment of resistance of the beam for limit state design as per IS : 456-2000.

35. Determine by Castigliano's method, the vertical deflection and horizontal deflection at the free end C of a cantilever bend ABC having vertical leg AB of length 2L and horizontal leg BC of length L. End A is bottom end which is fixed support, B is a rigid joint and end C is free. There is a vertically downward load W at the free end C. Flexural rigidity EI is constant throughout.

36. Draw shear force and bending moment diagram for the beam shown in Fig. given below. Mention the sign convention adopted.

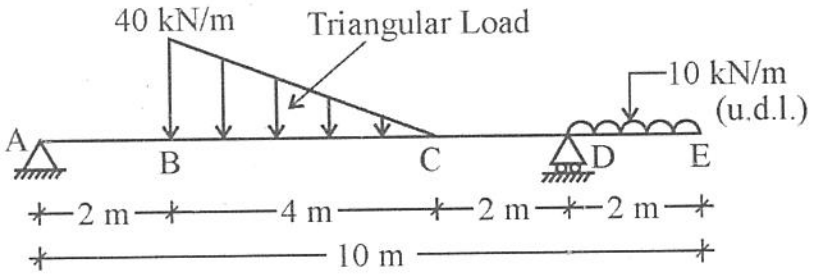

Fig.

37. A natural soil deposit has specific gravity of 2.48, bulk unit weight of 17.6 kN/m^3 and water content of 8%. If the void ratio remains constant, calculate the amount of water required to be added to 10 cubic metre of soil to raise the water content to 18%. What will be the degree of saturation in this condition ?

38. A reinforced concrete beam of M 20 grade concrete, 300 mm wide and 500 mm deep is required to resist a superimposed moment of 152 kN.m at an intermediate support of a continuous beam. Using mild steel bars, calculate A_{st} at top if 4 Nos. 16 mm dia. bars are required to be continued at bottom from one span to other. Assume effective cover to compression steel as 45 mm and that to tension steel as 50 mm.

SPACE FOR ROUGH WORK

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