Answer Booklet No. _____

EP-RPSC-AE-18M-01-SW-CE

Optional Paper

Subject: **CIVIL ENGINEERING**

Roll No._____
(In Figures)

Roll No._____

_____
_____
(In Words)

Total Pages : **32**

Time : 3 Hours

Maximum Marks : **200**

(Signature of the Invigilator)

(Signature of the Candidate)

FOR EXAMINER'S USE ONLY

Marks Obtained

PART-A		PART-B		PART-C	
Q.No.	Marks Obtained	Q.No.	Marks Obtained	Q.No.	Marks Obtained
1		21		33	
2		22		34	
3		23		35	
4		24		36	
5		25		37	
6		26		38	
7		27		39	
8		28			
9		29			
10		30			
11		31			
12		32			
13					
14					
15					
16					
17					
18					
19					
20					
Total		Total		Total	

INSTRUCTIONS FOR CANDIDATES

1. Write your Roll Number in the space provided on the top of this page.
2. Read the instructions given inside carefully.
3. Two pages are attached at the end of the Test Booklet for rough work.
4. You should return the Test Booklet to the Invigilator at the end of the examination and should not carry any paper with you outside the examination hall.
5. A candidate found creating disturbance at the examination center or misbehaving with Invigilation Staff or cheating will render himself liable to disqualification.

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Marks Obtained

PART-A:

PARTA:

PART-A: _____

Total: _____

_____. _____. _____.

(Marks in Words) (Signature of Examiner) (Signature of Head Examiner)

RSM-08 CIVIL

ENGINEERING - I

Time: Three **Hours** **Maximum Marks**: **200**

IMPORTANT NOTE

(a) The question paper has been divided into three parts - Part A, B and C. The number of questions to be attempted and their marks are indicated in each part.

(b) Attempt answers **either** in Hindi or English, not in both.

(c) Write the answers in the space provided below each question. Additional Booklet or Blank Paper will neither be provided not allowed.

(d) The candidates should not write the answers beyond the limit of words prescribed in Parts A, B and C, failing which the marks can be deducted.

(e) In case candidate makes any identification mark i.e. Roll No./Name/Telephone No./Mobile No. or any other marking either outside or inside the answer book, it would be treated as using unfair means. The candidature of the candidate for the entire examinations shall be rejected by the Commission, if he is found doing so.

PART-A

Marks: 40

Note- Attempt all the twenty questions. Each question carries **2 marks.** Answer should not exceed 15 words.

Q.1 Give the interrelationship between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus of solids (K).

Q.2 What is the % carbon in Mild steel?

Q.3 What is the relationship between the modulus of elasticity of Mild Steel under TENSION and under COMPRESSION?

Q.4 Define 0.2% proof stress

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Q.5 What is Volumetric Strain?

Q.6 Define yield point.

Q.7 What is Yield Plateau?

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Q.8 What is brittle Material?

Q.9 Define proof stress.

Q.10 What are the properties of Ductile Materials?

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Q.11 What is Visco-Elastic Material?

Q.12 Write down 2-2 example of Brittle and Ductile Materials

Q.13 What are differences between Rigid and Deformable Materials?

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Q.14 Define Tenacity?

Q.15 What do you mean by a composite bar?

Q.16 Define Bearing Stress.

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Q.17 Define Bending Stress.

Q.18 How many number of elastic constants are required to define an anisotropic material?

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Q.19 Write down one example of orthotropic Material.

Q.20 What is modulus elasticity of Aluminium?

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PART-B

Marks: 60

Note- Attempt all the twelve questions. Each question carries 5 marks. Answer should not exceed 50 words.

Q.21 Draw the stress-strain curve for mild steel and show the salient points.

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Q.22 A round bar of steel tapers uniformly from a diameter of 3.5 cm t0 2.5 cm in a length of 50 cm. If an axial force of 35000 N is applied at each end, determine the elongation of the bar, E =205 kN /mm^2.

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Q.23 Why do Solid Mechanics studied?

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Q.24 What do you mean by **'State of Stress'? Make the sketch of 2D and 3D state of Stress at a stressed point.**

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Q.25 What is Off-Set Method? Plot Stress-Strain Curve of Al/Cu.

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Q.26 Establish mathematical relationship between true stress and engineering stress.

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Q.27 Drive mathematical relationship between true strain and engineering strain.

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Q.28 What do you mean by Elasticity and Plasticity?

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Q.29 Explain Creep and Stress relaxation with the help of neat sketch?

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Q.30 Define Fatigue and Endurance Limit.

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Q.31 What is toughness? Explain with the help of a sketch.

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Q.32 What is HOOKE's Law? Explain.

PART-C

Marks: 100

Note- Attempt any 5 out of 7 Questions. Each question carries 20 marks. Answer should not exceed 200 words.

Q.33 A prismatic bar of circular cross section is loaded by a direct tensile force of 80 kN. The bar has length equal to 3 m and diameter as 40 mm. It is made of metal with modulus of elasticity, E = 70 GPa and Poisson's ratio v = 1/3. Calculate the elongation, the decrease in diameter and change in volume of the bar.

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Q.34 The tensile test has been performed on a 50 mm long steel tube having 18 mm external diameter and 12 mm internal diameter. The axial load of 2 KN produced a stretch of 3.36×10^{-3} mm and a lateral contraction of the outer dia. Of 3.62×10^{-4} mm. Calculate young´s modules, Poisson´s ratio and the bulk modules for the material.

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Q.35 A vertical tapered rod of length *L* has its diameter verifying linearly from 'd' at lower end to D at the Upper end which has fixed support. Young's modulus of the material is *E.* Show that the elongation of the rod at its lower end when subjected to a longitudinal force *F* is given by $\boldsymbol{\delta}=\frac{4FL}{\pi dDE}$.

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Q.36 What do you understand by Resilience and Modulus of resilience? Explain with the help of a neat sketch.

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Q.37 Define following terms and explain with the help of a sketch.

(i) Engineering Stress (ii)Engineering Strain (iii) True Stress (iv) True Strain

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Q.38 A compound bar consists of a circular rod of steel of diameter 25 mm, rigidly fitted into a copper tube of internal diameter 25 mm and thickness 2.5 mm. If the bar is subjected to an axial load of 100 kN, find the stresses developed in the two materials. Given $E_8 = 2\times10^5$ N/mm and $E_o = 1.2\times10^5$ N/mm^2.

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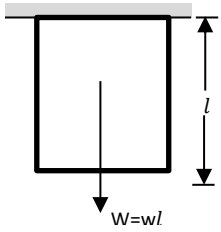
Q.39 Find elongation of a bar of uniform cross-section area 'A' and 'l' under action of its own weight. The bar weight 'w' per unit length. E= Modulus of elasticity. See figure below.