Reg. No.										

MANIPAL UNIVERSITY

SEVENTH SEMESTER B. ARCH. DEGREE EXAMINATION – MAY 2017

SUBJECT: ARC 409 – STRUCTURES VII

(2010 SCHEME)

Thursday, May 11, 2017

Time: 10:00 – 13:00 Hrs. Max. Marks: 50

- **Answer any FIVE FULL questions.**
- **Missing data be suitably assumed.**
- **Support answers with neat sketches wherever appropriate.**
- **Use of IS 456-2000 allowed. Use SI units.**

1A. Explain the salient differences between pre tensioned and post tensioned PSC members citing advantages/limitations in each case.

1B. A prestressed beam of rectangular section BxD and span "L" is subjected to udl of intensity of "w" over entire length. The eccentricity of the cable is "e". The prestress force in the straight cable is "P". Draw the stress block diagram for beam.

i) At mid span ii) At support

(5+5 = 10 marks)

2A. A PSC beam 400x600 mm in section has a span of 6m and is subjected to an udl of 20kN/m including the self weight of beam. The pre stressing tendon is located at 150mm from bottom (soffit) of the beam. Effective pre stress force applied is 960kN. Determine the extreme fibre stress in bending in concrete at

i) mid span section ii) support section.

2B. Comment on the causes "loss of prestress" and its relevance in PSC members.

(6+4 = 10 marks)

3A. A simply supported PSC beam 400x800 mm in section has a span of 6m. The beam is prestressed with a bent tendon with eccentricity zero at ends and 150mm at midspan. Given a point load of 180 kN is applied at mid span and effective pre stress force is 1200kN. Calculate stresses:

i) At the mid span section ii) At support section

3B. Explain the significance of limiting max strain in concrete and minimum strain in steel in RCC members.

(7+3 = 10 marks)

4A. Explain how to determine the Mu of flanged section, given the Xu < depth of flange.

4B. Design a simply supported slab given clear span of 3.5m. The live load at service condition is $2kN/m^2$. The grade of concrete being M20 and steelTor40 grade.

(3+7 = 10 marks)

5A. Write comparative note on limit state method and working stress method as applied to RCC members.

5B. A beam 230mm x 400mm effective depth is reinforced with 3# 16Φ Tor40 grade steel bars in tension. Compare both the moment capacity Mu when concrete used is

i) M15 ii) M20

(3+7 = 10 marks)

6. **Write short note on:**

6A. Comparison of salient aspects RCC and PSC construction

6B. Shear reinforcement for beams

6C. Mu of doubly reinforced section

(10 marks)