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Sixth Semester B.E. Degree Examination, June/July 2017
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks: 100

Note: 1. Answer any TWO full questions from Part-A, ONE from Part-B.
2. Use of IS 456 – 2000 and SP – 16 is permitted.

PART – A

- 1** A rectangular beam of cross section $300 \times 450\text{mm}$ is supported on 5 columns which are equally spaced at a c/c distance of 3.3m. The columns are $300 \times 300\text{mm}$ in section. The reinforcement in beam consists of 4 bars of 16mm dia (+ve reinforcement) at midspan and 4 bars of 16mm dia at all supports (–ve reinforcement). 2 bars of +ve reinforcement have been curtailed near each support. Anchor bars consists of 2 – 16mm dia. Stirrups are of 8mm dia. 2 legged vertical at 200 c/c. Draw longitudinal section and important cross sections. Grade of concrete M20 and steel Fe 415 grade. (20 Marks)
- 2** A dog legged staircase is to be detailed with the following particulars :
- | | |
|------------------------------------|---------------------------------|
| Size of stair case room | = $2200 \times 4600\text{mm}$ |
| Width of flight | = 1050mm |
| Width of landing | = 1050 mm |
| Number of treads in each flight | = 10 |
| Thread | = 250mm and |
| Rise | = 150mm |
| Wall thickness | = 230mm all-round |
| Waist slab thickness | = 150mm |
| Main steel | = 120mm HYSD bars @ 100 c/c and |
| Distribution steel for each flight | 8mm = @ 200 c/c |
- First flight starts from ground floor level (GFL) and foundation is 750mm below GFL :
 Second flight rests on wall. Draw to a suitable scale
- a. Plan
 - b. Section along first flight
 - c. Section along second flight. (20 Marks)
- 3** A square column of size $300\text{mm} \times 300\text{mm}$ is provided with square isolated footing of size $3\text{m} \times 3\text{m}$.
- | | |
|--------------------|--------------------------------|
| Details of column | : height of column 3m above GL |
| Longitudinal steel | : 8 no.'s of 12mm dia |
| Transverse steel | : 8mm dia lies at 200 c/c |
- (One square tie connecting corner bars + another diamond tie connecting inner bars).
- | | |
|---------------------------------|---|
| Details of footing | : depth of footing 1.2m below GL |
| Depth of footing at column face | : 520mm |
| Depth of footing at the edge | : 230mm |
| Reinforcement | : a mesh of 12mm dia HYSD bars at 150mm c/c |
- Provide suitable cover to steel reinforcement
 Draw to a suitable scale :
- a. Plan
 - b. Sectional details
 - c. Prepare bar bending schedule. (20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8=50$, will be treated as malpractice.

PART – B

- 4 Design a cantilever retaining wall to retain earth embankment 4.75m height above ground level. The density of earth 18kN/m^3 and its angle of repose - 30° . The embankment is horizontal at the top. SBC of the soil may be taken as 200 kN/m^2 available at 1.25m below ground level the coefficient of friction between soil and concrete is 0.5. Adopt M20 grade of concrete and Fe 415 steel. (40 Marks)
- Draw to a suitable scale :
- Cross sectional elevation
 - Longitudinal section showing stem reinforcement and curtailment for a length of 2m.
 - Section showing heel and toe reinforcement. (20 Marks)
- 5 Design an RCC combined footing for two columns 3.2m apart.
Column A– $300\text{mm} \times 300\text{mm} = P_A = 825\text{ kN}$
Column B– $300\text{mm} \times 300\text{mm} = P_B = 930\text{ kN}$
Safe bearing capacity of soil may be taken as 175 kN/m^2 . The boundary line is at a distance of 0.8m from the centre line of column A. Use M20 grade concrete and Fe 415 grade steel. (40 Marks)
- Draw to a suitable scale :
- Sectional elevation
 - Plan of bottom reinforcement
 - Cross-sections at salient points. (20 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, June/July 2017

Transportation Engineering – II

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Missing data, if any, may be suitably assumed.**

PART – A

- 1
 - a. Mention the different gauges that are used in Indian railways. Discuss the factors affecting adoption of a particular gauge. (06 Marks)
 - b. With neat sketches, explain coning of wheels and tilting of rails. (06 Marks)
 - c. What is meant by wear of rails? How do you classify the wear? Discuss the various causes of wear. (08 Marks)

- 2
 - a. List the different fixtures used in railway track and give the dimensional sketch of fish plate. (06 Marks)
 - b. Determine the quantity of materials required to construct a 800 m long BG railway track, assuming a sleeper density of $(n + 5)$. (06 Marks)
 - c. Calculate the maximum permissible train load that a B.G. locomotive can haul with 3 pairs of driving wheels with axle load of 22 kN each on a straight level track at a speed of 80 kmph. Calculate the reduction in speed, if the train has to run on a rising gradient of 1 in 200. What would be the further reduction in speed if the train has to negotiate a 4° curve on the rising gradient? Assume coefficient of friction as 0.2. (08 Marks)

- 3
 - a. Define: i) Super elevation ii) Negative cant
iii) Cant deficiency iv) Grade compensation on curves (06 Marks)
 - b. An 8° curve branches off from 4° main curve in B.G. layout. If the speed on branch line is 28 kmph, find the speed on main line. Cant deficiency is 7.61 cm. (06 Marks)
 - c. Calculate the maximum permissible speed on a curve of highspeed B.G. track having the following particulars:
Degree of curve = 1°
Amount of super elevation = 8 cm
Length of transition curve = 130 m
Max. speed of the section likely to be sanctioned = 153 kmph. (08 Marks)

- 4
 - a. Calculate the elements of a BG turnout, if heel divergence is 11.43 cm. Number of crossing is 16 and angle of switch is $1^\circ 8' 0''$. Straight arm distance = 0.9 m. (06 Marks)
 - b. With a neat sketch show the details of acute angle crossing. Indicate: i) actual, ii) theoretical rose of crossing. (06 Marks)
 - c. What is signaling? What are the objectives of signaling? List the types of signals. (08 Marks)

PART – B

- 5
 - a. Write a note on aircraft characteristics. (08 Marks)
 - b. Define wind rose diagram. With a neat sketch, explain the method of locating the best orientation of runway. (06 Marks)
 - c. Write a note on airport classification. (06 Marks)

- 6 a. A taxiway is to be designed for operating a Boeing aircraft, which has the following characteristics. Determine the turning radius of the taxiway.
Wheel base $W = 17.70$ m
Tread of main gear = 6.62 m
Width of taxiway, $T = 22.5$ m
Turn-off speed = 40 kmph
Coefficient of friction = 0.3 (06 Marks)
- b. Explain the various types of airport markings. (06 Marks)
- c. An airport is planned at an elevation of 380 m above MSL. The monthly mean of maximum and average daily temperatures for the hottest month at the site are 40°C and 28°C respectively. The effective gradient is 0.18 percent. Determine the length of runway required at the proposed site if the basic runway length is 1900 m. (08 Marks)
- 7 a. Write short notes on:
i) Tunnel lining
ii) Tunnel drainage (08 Marks)
- b. Explain various shapes of tunnel with neat sketches. (06 Marks)
- c. With a neat sketch, explain the needle beam method of tunneling in soft soils. (06 Marks)
- 8 a. Explain the functions of:
i) Wharfs and quays
ii) Wet and dry docks (08 Marks)
- b. Draw a neat sketch of artificial harbor, explain the various components. (06 Marks)
- c. Define breakwater. Explain any one type of breakwater. (06 Marks)

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10CV64

Sixth Semester B.E. Degree Examination, June/July 2017
Geotechnical Engineering - II

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting
atleast TWO questions from each part.
2. Assume missing data suitably.**

PART – A

- 1
 - a. What are the objectives of Soil Exploration? (06 Marks)
 - b. List the methods of dewatering techniques used in the field. Explain any one method, with a neat sketch. (06 Marks)
 - c. A sampling tube has inner diameter of 70mm and cutting edge diameter of 68mm. Its outside diameter are 72 mm and 74 mm respectively. Determine area ratio, inside clearance, outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 550mm with length of sample recorded being 530mm. Find the recovery ratio. (08 Marks)

- 2
 - a. List the assumptions and limitations of Boussinesq's theory of stress in soils. (08 Marks)
 - b. Explain the construction and use of Newmark's chart. (08 Marks)
 - c. A water tank is supported by a ring foundation having outer diameter of 10m and inner diameter of 7.5m. The ring foundation transmit uniform load intensity of 160kN/m². Compute the vertical stress induced at a depth of 4m below the centre of ring foundation using Westergaard's analysis. Take $\mu = 0$. (04 Marks)

- 3
 - a. What are Flow nets? Explain with a neat sketch. List their characteristics. (08 Marks)
 - b. Explain Graphical method of determining phreatic line in homogeneous earthen dam with horizontal drainage filter. (08 Marks)
 - c. For the earthen dam of homogeneous section with horizontal filter, the coefficients of permeability in x & y directions are 8×10^{-7} cm/sec and 3.6×10^{-7} cm/sec respectively. The flow nets constructed gave number of flow channels to be 4 with potential drops 18. Determine the discharge through the dam in m³/day if the head during seepage was 14m. (04 Marks)

- 4
 - a. With a neat sketch, explain different types of earth pressures. (06 Marks)
 - b. Differentiate between Rankine's and Coloumb's theory. (04 Marks)
 - c. A retaining wall of 8m height retains sandy material. The properties of sand are $e = 0.6$, $Q = 30^\circ$ and $G = 2.65$. The water table is at a depth of 2.5m from the ground surface. Draw the earth pressure diagram and determine the magnitude and point of application of the total active earth pressure. (10 Marks)

PART – B

- 5
 - a. With neat sketches, explain types of slope failures and its causes. (08 Marks)
 - b. Explain Friction circle method of stability analysis to slopes. (08 Marks)
 - c. An embankment is inclined at an angle of 35° and its height is 15m. The angle of shearing resistance is 15° and cohesion intercept is 40kN/m². The unit weight of soil is 18kN/m³. Find the factor of safety with respect to cohesion. Consider Taylor's stability number as 0.06. (04 Marks)

- 6 a. With a neat sketch, explain the effect of eccentric loading on footing. (04 Marks)
b. With a neat sketch, explain plate load test. (06 Marks)
c. Determine the safe bearing capacity of square footing of 2.1m width placed at a depth of 1.5m in a soil with a moist unit weight of 17kN/m^3 , $C = 15\text{kN/m}^2$ and $Q = 30^\circ$. Take $N_c = 11.8$, $N_q = 3.9$ and $N_r = 1.7$. What is the change in bearing capacity if the water table raises to 0.5m above the base of the footing? Assume $F = 3$. (10 Marks)
- 7 a. Explain the terms Immediate settlement, Consolidation settlement, Secondary settlement and Differential settlement. (08 Marks)
b. Estimate the immediate settlement of a footing of size $(2 \times 3)\text{m}$ resting at a depth of 2m in sandy soil whose compression modulus is 10N/mm^2 and the footing is expected to transmit a unit pressure of 160 kN/m^2 . Assume $\mu = 0.28$ and $I_f = 1.06$. (04 Marks)
c. A square footing $(1.2\text{m} \times 1.2\text{m})$ rests on a saturated clay layer of 4m deep. The soil properties are $W_L = 30\%$, $r_{\text{sat}} = 17.8\text{kN/m}^3$, $W = 28\%$ and $G = 2.68$. Determine the primary consolidation settlement if the footing carries a load of 300kN. (08 Marks)
- 8 a. Explain the factors influencing the choice of foundation. (06 Marks)
b. Discuss the proportioning of isolation footing. (06 Marks)
c. Write a note on classification of pile foundation. (08 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2017
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs.

Max. Marks: 100

- Note:** 1. Answer any TWO questions from Part-A and ONE full question from Part-B.
 2. Missing data, if any, may be suitably assumed.

PART - A

- 1 a. What is reservoir sedimentation? Explain with neat sketch. Also discuss various methods of reservoir sediment control. (07 Marks)
 b. Briefly explain the procedure for determining the storage capacity and yield of a reservoir using mass curve. (08 Marks)
- 2 a. Explain the various modes of failure of gravity dam and mention their remedies. (07 Marks)
 b. Design the practical profile of a gravity dam of stone masonry given the following data :
 R.L. of base of dam = 1450m
 R.L. of F.R.L. = 1480.5m
 Specific gravity of the masonry = 2.4
 Safe compressive stress for masonry = 1200 kN/m²
 Height of waves = 1m. (08 Marks)
- 3 a. Explain the method of plotting phreatic line for an earth dam with horizontal filter at downstream. (07 Marks)
 b. For a homogeneous earth dam 52m high, and 2m free board a flow net was constructed and following results were obtained.
 Number of potential drops = 25
 Number of flow channels = 04
 The dam has a horizontal filter of 40m length at its d/s end. Calculate the discharge per meter length of the dam if the coefficient of permeability of the dam is 3×10^{-3} cm/sec. (08 Marks)

PART - B

- 4 Design the surplus work of a tank forming part of a chain of tanks.
 Combined catchment area = 25.89 sq.km
 Intercepted catchment area = 20.71 sq.km
 Maximum water level = + 12.75
 Full tank level = + 12.00
 Ground level at proposed site = + 11.00
 Ground level below proposed =
 Weir up to a reach of 6m(Fall) = + 10.00
 Top width of tank bund = 2.00m
 Tank Bund Level (TBL) = +14.50
 Side slopes of bund, on either side = 2 : 1
 Design saturation gradient (HGL) = 4 : 1
 Level of hard strata = + 9.50
 Ryve's coefficient for combined catchment = 9
 Ryve's coefficient for intercepted catchment = 1.5
 Provision may be made to make kutchra regulating arrangements to store water up to MWL in times of necessity. (25 Marks)
- Draw :
- a. Half plan at foundation and half plan at ground level. (20 Marks)
 b. Draw half longitudinal section and half longitudinal elevation. (15 Marks)
 c. Cross section across surplus weir. (10 Marks)

- 5 Design (Hydraulic design only) a suitable cross-drainage work given the following data at the crossing of a canal and a drainage.

Canal :

Full supply discharge	= 32 cumecs
Full supply level	= + 213.5
Canal bed level	= + 212.0
Canal bed width	= 20
Trapezoidal canal section with 1.5H : 1V slopes	
Canal water depth	= 1.5m

Drainage :

High flood discharge	= 300 cumecs
High flood level	= 210.0m
High flood depth	= 2.5m
General ground level	= 212.5m.

(25 Marks)

Draw :

- Plan showing all details.
- Longitudinal section.
- Cross section showing all details.

(20 Marks)

(15 Marks)

(10 Marks)



Sixth Semester B.E. Degree Examination, June/July 2017
Theory of Elasticity

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. When a body is subjected to stresses σ_x , σ_y and σ_z in x, y and z directions respectively, Obtain an expression for σ_x as $\sigma_x = \lambda \epsilon + 2G \epsilon_x$. (10 Marks)

Where, $\lambda = \frac{\mu E}{(1-2\mu)(1+\mu)}$ and $\epsilon = \epsilon_x + \epsilon_y + \epsilon_z$.

Hence derive $(\lambda + G) \frac{\partial \epsilon}{\partial x} + G \nabla^2 u + x = 0$.

- b. The possible state of stress in a solid is given by

$$\sigma_x = c_1 x^2 y z$$

$$\sigma_y = c_2 x y z^3$$

$$\sigma_z = 2(x^3 + y^3 - 2yz)$$

$$\tau_{xy} = -3xy^2z$$

$$\tau_{yz} = c_3[6y^2z^2 - 5xz^4 + 8(x^2 + y^2)]$$

$$\tau_{zx} = -3xyz^2. \text{ Find the values of } c_1, c_2 \text{ and } c_3.$$

(10 Marks)

- 2 a. Derive the two sets of compatibility equations in terms of strains for three dimensional cases. (10 Marks)

- b. Find the constants of c_1 , c_2 and c_3 at point (2, -1) for the stress distribution given as :

$$\sigma_x = -2xy^2 + c_1x^3$$

$$\sigma_y = -1.5c_2xy$$

$$\tau_{xy} = -c_2y^3 - c_3x^2y.$$

(10 Marks)

- 3 a. If E is replaced by $\frac{E_1}{1-\mu_1^2}$ and μ by $\frac{\mu_1}{1-\mu_1}$ in plane stress constitutive relations, prove that

$$\nabla^2(\sigma_x + \sigma_y) = -\frac{1}{(1-\mu_1)} \left(\frac{\partial X}{\partial x} + \frac{\partial Y}{\partial y} \right).$$

(10 Marks)

- b. Determine the principal strains and their directions for an equiangular strain rosette.

Given : $\epsilon_0 = 550 \times 10^{-6}$ $\epsilon_{60^\circ} = -100 \times 10^{-6}$ $\epsilon_{120^\circ} = 150 \times 10^{-6}$

(10 Marks)

Also determine the principal stresses given $\mu = 0.3$ and $E = 200\text{GPa}$.

- 4 a. For a simply supported beam of length $2L$, depth $2h$ and unit width loaded by concentrated load W at midspan, the stress function satisfying the loading condition is (10 Marks)

$$\phi = \frac{b}{6} xy^3 + cxy. \text{ Determine the constants "b" and "c". Also find the stresses in the beam.}$$

- b. Check whether the following is a stress function. If it is, investigate what problem it can solve when applied to region $y = 0$, $y = d$ and $x = 0$ and $x \geq 0$. (10 Marks)

$$\phi = -\frac{F}{d^3} xy^2 (3d - 2y).$$

PART - B

- 5 a. Derive equation of equilibrium in polar co-ordinates. (10 Marks)
- b. Show that $\phi = \frac{-py}{\pi} \tan^{-1} \frac{y}{x}$ is a stress function. Also prove that it represents a case of simple radial stress distribution. (10 Marks)
- 6 a. Prove that for a solid rotating disk, the maximum stresses are given by
 $(\sigma_r)_{\max} = (\sigma_\theta)_{\max} = \left(\frac{3+\mu}{8} \right) \rho \omega^2 b^2$. (10 Marks)
- b. Also prove that for a hollow disk of inner radius "a" and outer radius "b",
 $(\sigma_r)_{\max} = \left(\frac{3+\mu}{8} \right) \rho \omega^2 (b-a)^2$. Show that $(\sigma_\theta)_{\max} > (\sigma_r)_{\max}$. (10 Marks)
- 7 Discuss the effect of a circular hole on the stress distribution in a rectangular plate subjected to a tensile stress s in x - direction only and hence evaluate stress concentration factor. (20 Marks)
- 8 a. Prove that for non - circular sections subjected to torsion $T = GJ\theta$.
 Where, $GJ =$ Torsional rigidity. (10 Marks)
- b. A 2 - celled thin walled tube, each cell having dimensions of $a \times a$ with uniform wall thickness δ . Show that there will be no stress in the central web when the tube is twisted. (10 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2017

Rural Water Supply and Sanitation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. Briefly explain the various sources of water being practicing in rural area. (06 Marks)
 - b. List the water borne diseases and their controlling measures. (08 Marks)
 - c. Discuss the health significance and limits of the following parameters :
 - i) Fluoride ii) Nitrates iii) Sulphate iv) Chloride. (06 Marks)
- 2
 - a. What is Defluoridation? Explain Nalagonda technique for removal of fluoride, with neat sketch. (10 Marks)
 - b. Define Disinfection. Explain the break point chlorination with graphical representation. (10 Marks)
- 3
 - a. Explain the following with neat sketch : i) Aqua privy ii) Two pit latrines. (10 Marks)
 - b. Design a septic tank and soak well for the following data :
 - i) No. of people = 100 ii) Sewage / capita / day = 120 litres
 - iii) Desludging period = 1 year iv) Percolation rate = 1250ℓ/m³/day
 - v) Length to width ratio of septic tank = 4 : 1 vi) Detention period = 24 hours
 - vii) Rate of sludge deposited = 30litres/capita/year viii) Depth of septic tank = 1.5m
 - ix) Depth of soak pit = 2m x) Free board = 0.3m. (10 Marks)
- 4
 - a. Explain the disposal of storm water and sullage disposal in rural areas. (10 Marks)
 - b. What is Rain water harvesting? Discuss briefly with sketches how the rain water is being harvested from roof top. (10 Marks)

PART - B

- 5
 - a. Explain the different methods of communication of communicable diseases with examples. (10 Marks)
 - b. Define Communicable diseases and explain the general methods of control of communicable diseases. (10 Marks)
- 6 Explain the following :
 - a. Salvaging.
 - b. Dumping in low lands.
 - c. Composting.
 - d. Biogas plant. (20 Marks)
- 7
 - a. Explain all the essentials necessary to obtain the objectives of milk sanitation. (08 Marks)
 - b. Describe the important points to be considered for planning the construction of a cow shed. (04 Marks)
 - c. Explain any two method of pasteurization. (08 Marks)
- 8
 - a. Explain the life cycle of a mosquito. (08 Marks)
 - b. Mention the diseases transmitted by mosquito. (04 Marks)
 - c. Explain the various fly control measures. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Sixth Semester B.E. Degree Examination, June/July 2017
Traffic Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**
2. Assume any missing data suitably.

PART – A

- 1 a. Define traffic engineering. Briefly explain the scope of traffic engineering indicating the objectives. (10 Marks)
- b. A passenger car weighing 2 tonnes is to accelerate at a rate of 3 m/sec^2 in the first gear from a speed of 10 Kmph. The gradient is +1% and the highway has a black topped surface. The frontal exposed area of the car is 2.0 m^2 and tyres have radius of 0.33m. The rear axle gear is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horse power needed and the speed of the engine. (10 Marks)
- 2 a. Briefly explain the various vehicular characteristics affecting the road design. (07 Marks)
- b. Explain total reaction time of driver with PIEV theory. (06 Marks)
- c. An ambassador car travelling at a speed of 60 Kmph on a level WBM road in good condition is suddenly allowed to coast by switching off the engine and putting the gear in neutral. What is the deceleration caused? (07 Marks)
- 3 a. Define the following terms :
 - i) Parking index
 - ii) Design capacity
 - iii) Journey speed
 - iv) Running speed. (04 Marks)
- b. List the objectives of traffic volume and parking surveys. (08 Marks)
- c. A vehicle travelling at 45 Kmph is stopped within 2.5 seconds after the application of brakes. Find out the average skid resistances. (08 Marks)
- 4 a. With a neat sketch, explain condition and collision diagram related to accident studies. (06 Marks)
- b. Explain the different forms presenting O and D data. (06 Marks)
- c. A vehicle of weight 30 tonnes skids through a distance equal to 50m, before colliding with another parked vehicle of weight 3 tonnes. After collision, both the vehicles skid through a distance equal to 16m, before stopping. Determine the speeds of vehicles assuming $f = 0.4$.
 - i) After collision
 - ii) At collision
 - iii) Before collision. (08 Marks)

PART – B

- 5 a. Mention the various assumptions made in queuing approach as applied to traffic flow. (10 Marks)
- b. The off-peak traffic flow arriving at random at toll booth facility is 90VPH and the peak flow is 180 VPH. The service rate, exponentially distributed, at the booth is 3.5 vehicles per minute. What is the average number of customers in the queue for each flow? (10 Marks)

- 6 a. Explain the following :
- i) Chi-square test
 - ii) Simulation technique (10 Marks)
- b. The spot speeds at a particular location are normally distributed with a mean of 51.7 KPH and a standard deviation of 8.3 KPH. What is the probability that :
- i) The speeds exceed 65 KPH?
 - ii) And the speeds lie between 40 KPH and 70 KPH.
 - iii) What is the 85th percentile speed?
- Take $\phi(1.6) = 0.9542$, $\phi(2.21) = 0.9864$, $\phi(1.41) = 0.9207$, $\phi(1.04) = 0.85$. (10 Marks)
- 7 a. Enumerate the design factors and advantages of a rotary intersection with neat sketch. (10 Marks)
- b. The average normal flow of traffic on cross roads A and B during periods are 410 and 260 PCU/hour. The saturation flows are 1260 and 1000 PCU/hour respectively. The all red time required for pedestrian crossing is 12 seconds. Design a two phase traffic signal by Webster's method. (10 Marks)
- 8 Write short note on :
- a. PCU
 - b. ITS
 - c. Informatory signs
 - d. Road side development. (20 Marks)
