

CE 3205
Transportation Engineering - I

Full Marks: 72

Time: 3 Hours

- N.B.:-
- (i) Answer any SIX questions, taking THREE from each section.
 - (ii) Figure in the margin indicate full marks.
 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1 (a) Briefly discuss, how the following factors affect the road safety: 6.00
 (i) Driver's fatigue, (ii) Driver's impatience and (iii) Driver's home worries mind
- (b) Discuss some well-known traffic management measures. 4.00
- (c) Calculate the running speed, when travel distance = 90 km, travel time = 70 minutes and delay = 15 minutes. 2.00
- Q.2 (a) Write short notes on: 4.50
 (i) Design hourly volume, (ii) Channelized intersection, and (iii) Collision diagram.
- (b) Design a lighting system, having given the following data: (i) Mounting height = 9 m (ii) Lamp size = 7500 lumens, and (iii) Coefficient of utilization = 0.44 for ratio of 2. Find the spacing required between lighting units to provide an average lux of 5.0. 3.50
- (c) List the common type of (i) Traffic Signs (ii) Parking System 2.50
- (d) Calculate the traffic density, when traffic volume = 400 vehicles/hr and traffic speed = 50 km/hr. 1.50
- Q.3 (a) Point out some safety measures for regulating the safe movement of (i) Motor cyclists & (ii) Pedestrians. 5.00
- (b) Illustrate the grade separated road intersection. Draw a neat sketch of a full clover leaf intersection with flow. 4.00
- (c) List the desirable properties of aggregates and bitumen for road construction. 1.50
- (d) Calculate the theoretical maximum capacity for a traffic lane at design speed of 80 km/hr. 1.50
- Q.4 (a) Explain the rules to determine the upper and lower values of speed limits for regulation of mixed traffic. 2.00
- (b) An isolated signal with pedestrian indications is to be installed at right-angled intersection with Road-1 of 18 m wide and Road-2 of 12 m wide. The peak hourly volume for each lane of Road-1 and Road-2 are 275 PCU and 225 PCU, respectively. The approach speeds are 55 kmph and 40 kmph for Road-1 and Road-2, respectively. Design the timings of traffic and pedestrian signals on the basis of 'Pedestrian Crossing Time'. 7.00
- (c) Briefly discuss the major three detrimental effects of traffic on our surroundings. 3.00

SECTION-B

- Q.5 (a) Write short notes on: (i) Traffic, (ii) Transport, (iii) Transportation, and (iv) Road user. 4.00
- (b) What are the different elements of transport? Discuss them briefly. 4.00
- (c) Explain the necessity and objects of highway planning. 4.00
- Q.6 (a) Explain with sketches the various factors controlling the alignment of roads. 4.00
- (b) What are the factors on which the geometric design of highway depend? Explain briefly. 4.00
- (c) Calculate the minimum sight distance required to avoid a head-on collision of two cars approaching from the opposite directions at 80 and 70 kmph. Assume a reaction time of 2.5 seconds, coefficient of frictions of 0.4, and a brake efficiency of 50%, in either case. 4.00
- Q.7 (a) Write short notes on: (i) Camber, (ii) Kerbs, (iii) Right of way, (iv) Frontage road. 4.00
- (b) Derive an expression for calculating the OSD on a highway. 4.00
- (c) A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill both comfort condition and headlight sight distance requirements for a design speed of 80 kmph. Assume allowable rate of change of centrifugal acceleration = 0.6 m/sec³. 4.00
- Q.8 (a) Derive an expression for finding the SSD at level and at grades. 4.00
- (b) Define 'Superelevation'. Write down the steps for practical design of superelevation. 4.00
- (c) Find the total width of a pavement on a horizontal curve for a new national highway to be aligned along a rolling terrain with a ruling minimum radius. Assume ruling design speed = 80 kmph, normal pavement width = 7.0 m, number of lanes = 2, wheel base of the truck = 6 m, coefficient of friction = 0.15, and maximum value of superelevation = 7%. 4.00

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SECTION-A

- Q.1 (a) Write short notes on (i) Traffic (ii) Road user (iii) PCU (iv) Road safety 4.00
(b) Discuss briefly the road user characteristics and their influence in traffic performance. 4.00
(c) Explain the terms: (i) DHV and (ii) LOS. Write the objectives of origin and destination study. 4.00
- Q.2 (a) Draw a collision diagram. Discuss the various measures generally adopted to reduce the rate of accident. 6.00
(b) Write short notes on: (i) Conflicts point (ii) Over-pass (iii) By-pass and (iv) Fly-over. 4.00
(c) Write the design factors generally considered in highway lighting. 2.00
- Q.3 (a) Briefly discuss the functions of (i) Traffic signs (ii) Traffic signals (iii) Traffic islands (iv) Road marking 4.00
(b) Draw a full clover leaf grade separated intersection and, write its advantages and disadvantages. 4.00
(c) Discuss the parking problems in Rajshahi city and suggest some remedial measures. 4.00
- Q.4 (a) Discuss the various measures adopted for the safety of pedestrians. 4.00
(b) Discuss the well-known traffic management measures. 3.50
(c) Distinguish between: (i) Hardness and Toughness (ii) Skid and Slip (iii) Cutback and Emulsion 4.50

SECTION-B

- Q.5 (a) Write down the advantages and disadvantages of road transport. 4.00
(b) Discuss the role of transportation for the development of a country. 4.00
(c) Discuss the common elements of every transport system. 4.00
- Q.6 (a) What are the objects of highway geometric design? List the various geometric elements to be considered in highway design. 4.00
(b) Discuss various surveys that are carried out before planning a highway system for a given area. 4.00
(c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design a summit curve for a speed of 100 kmph so as to have an OSD of 470 m. 4.00
- Q.7 (a) Write short notes on: (i) Camber, (ii) Frontage road, (iii) Right of way, and (iv) Off tracking. 4.00
(b) Derive an expression for finding the SSD at level and at grades. 4.00
(c) Calculate the safe stopping sight distance for a design speed of 50 kmph for (i) two-way traffic on a two lane road, and (ii) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds. 4.00
- Q.8 (a) What do you mean by 'Superelevation'? Write down the steps for practical design of superelevation. 4.00
(b) Derive an expression for OSD on a highway. 4.00
(c) Explain with sketches, how obligatory points control the highway alignment. 4.00

The End

Transportation Engineering - I

Full marks: 72

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- N.B:-**
- (i) Answer any **SIX** questions, taking **THREE** from each section.
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SECTION-A

- Q.1(a) What are the factors responsible for road accidents with respect to (i) driver's inability and negligence, (ii) vehicle defects, and (iii) road defects? 5.00
- (b) Differentiate between travel speed, running speed and spot speed. How is the spot speed study data used in drawing speed distribution curves? Discuss the use of such curves. 4.00
- (c) Determine the average future traffic flow after a total period of ten years on a highway having following traffic data: 3.00

Existing average flow, veh/hr		Annual increase
Peak hours = 590	Off-peak hours = 306	5.5%

- Q.2(a) Write short notes on: (i) AADT, (ii) Interchange ramps, (iii) Channelizing islands, and (iv) Collision diagram. 4.00
- (b) As a Municipal Engineer of a Municipality of about 100,000 people, which has an abnormally high rate of accidents, what general recommendations would you make to the Municipal Council for a programme to reduce accidents? 5.00
- (c) Design a ~~short~~ street lighting system using following data: (i) Mounting height = 9 m, (ii) Lamp size = 6000 lumens, (iii) Average lux = 5.0, (iv) Maintenance factor = 0.8, (v) from chart, for ratio of 2, coefficient of utilization = 0.4. 3.00
- Q.3(a) **What are the warrants for installation a traffic control signal?** Write the importance of TSM. 4.00
- (b) An isolated signal with pedestrian indications is to be installed at right-angled intersection with Road-1 of 18 m wide and Road-2 of 12 m wide. The peak hourly volume for each lane of Road-1 and Road-2 are 275 PCU and 225 PCU respectively. The approach speeds are 60 kmph and 45 kmph for Road-1 and Road-2 respectively. Design the timings of traffic and pedestrian signals on the basis of pedestrian crossing time. 8.00
- Q.4(a) List the common type of (i) Pavement markings, and (ii) Parking systems. 3.00
- (b) What are the different measures adopted for the safety of pedestrians at crossings of roads? State their relative merits. 4.50
- (c) Distinguish between: (i) Hardness and Toughness, (ii) Skid and Slip, and (iii) Cut-back and Emulsion. 4.50

SECTION-B

- Q.5(a) Explain the role of transportation in rural development of Bangladesh. 4.00
- (b) Write down the advantages and disadvantages of road transport. 4.00
- (c) What are the common elements of every transport system? Discuss them briefly. 4.00
- Q.6(a) Discuss various surveys that are carried out before planning a highway system for a given area. 4.00
- (b) Write down the classification of road based on location and function. Explain the probable reasons hampering the road development in Bangladesh. 4.00
- (c) Calculate SSD for a design speed of 60 kmph for (i) two-way traffic on a two-lane road, and (ii) two-way traffic on a single lane road. Assume $f = 0.35$ and $t = 2$ sec. 4.00
- Q.7(a) Write short notes on: (i) Right of way, (ii) Frontage road, (iii) Camber, and (iv) Kerbs. 4.00
- (b) What is geometric design of highway? Explain the different elements of geometric design. 4.00
- (c) The speeds of overtaking and overtaken vehicles are 80 and 50 kmph respectively on a two-way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec^2 , (i) calculate safe overtaking sight distance, (ii) mention the minimum and desirable length of overtaking zone, and (iii) draw a neat sketch of the overtaking zone and show the position of the sign posts. 4.00
- Q.8 (a) What is 'Superelevation'? Enumerate the steps for practical design of superelevation. 4.00
- (b) Derive an expression for finding OSD on a highway. 4.00
- (c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design a summit curve for a speed of 100 kmph so as to have an OSD of 450 m. 4.00

The End

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Transportation Engineering - I

Full Marks: 72

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 (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1 (a) Briefly discuss how width of vehicles and road surface condition affect the traffic performance. 3.00
 (b) Draw a neat sketch of: (i) Collision diagram, (ii) Full cloverleaf, and (iii) Land-use and transport feedback cycle. 4.50
 (c) Discuss briefly the detrimental effects of traffic on our surroundings. 4.50
- Q.2 (a) Write short notes on: (i) PCU, (ii) AADT, (iii) DHV, and (iv) TPF. 4.00
 (b) Write the objects and uses of O & D study. 4.00
 (c) Write the name of parking facilities. Find the spacing between lighting units from the data: 4.00
 (i) Width of road = 15 m, (ii) Mounting height = 6 m, (iii) Lamp size = 600 lumens, (iv) Average lux = 5, and (v)

Ratio	1.5	2.0	2.5	3.0	3.5
Coefficient of utilization	0.35	0.40	0.45	0.48	0.50

- Q.3 (a) Write short notes on: (i) Level of service, (ii) Grade separated intersection, and (iii) By-pass. 3.00
 (b) Define 'Road Safety'. Write the objectives of various road safety measures. 4.00
 (c) Write the objective of TSM and briefly discuss the well-known traffic management measures. 5.00
- Q.4 (a) Discuss the types and function of: (i) Traffic sign, and (ii) Traffic signal. 4.00
 (b) Explain the terms: (i) Toughness, and (ii) Stripping. Three cars travel over a 80 m section of a highway at constant speed of 20, 22 and 23 m/sec. Calculate the TMS and SMS for this section. 4.00
 (c) Discuss the production and uses of the following bituminous materials: (i) Air-blown bitumen, (ii) Cut-back, and (iii) Emulsion. 4.00

SECTION B

- Q.5 (a) Write down the characteristics of road transport in comparison with other modes of transportation. 4.00
 (b) Explain the roles of transportation in rural development of Bangladesh. 4.00
 (c) What are the different elements of transport? Discuss them briefly. 4.00
- Q.6 (a) Explain the necessity and objects of highway planning. 4.00
 (b) What are the different types of road patterns? Discuss the advantages and disadvantages of rectangular and block pattern. 4.00
 (c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design a summit curve for a speed of 100 kmph so as to have an OSD of 470 m. 4.00
- Q.7 (a) Explain with sketches the various factors controlling the alignment of roads. 4.00
 (b) Write short notes on: (i) Kerbs, (ii) Right of way, (iii) Off tracking, and (iv) Frontage road. 4.00
 (c) The speeds of overtaking and overtaken vehicles are 70 and 40 kmph respectively on a two-way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec², (i) calculate safe-overtaking sight distance, (ii) mention the minimum and desirable length of overtaking zone, and (iii) draw a neat sketch of the overtaking zone and show the position of the sign posts. 4.00
- Q.8 (a) What do you mean by superelevation? Enumerate the steps for practical design of superelevation. 4.00
 (b) Derive an expression for finding the stopping sight distance at level and at grades. 4.00
 (c) Calculate the extra width of pavement required on a horizontal curve of radius 700 m on a two-lane highway, the design speed being 80 kmph. Assume wheel base, $t = 6$ m. 4.00

The End

Heaven's Light is Our Guide
DEPARTMENT OF CIVIL ENGINEERING
 RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering **THIRD** Year **EVEN SEMESTER** Examination, 2016

CE 3205
Transportation Engineering - I

Full Marks: 72

Time: 3 Hours

- N.B.:-
- (i) Answer any **SIX** questions, taking **THREE** from each section.
 - (ii) Figure in the margin indicate full marks.
 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1 (a) Discuss briefly the various factors which affect the road user characteristics and their influence in traffic performance. 6.00
- (b) Write short notes on: (i) 30th highest hourly volume, (ii) 85 percentile speed, and (iii) The land use and transport feedback cycle. 6.00
- Q.2 (a) Distinguish between: (i) Skid and Slip, (ii) SMS and TMS, (iii) Fixed delays & Operational delays, and (iv) By-pass and Fly-over. 6.00
- (b) Explain the grade separated intersection with advantages and disadvantages. 3.00
- (c) Where and why parking is prohibited? 3.00
- Q.3 (a) Briefly discuss the important traffic control measures generally used for control of traffic. 5.00
- (b) Discuss the importance of parking study and write the advantages and disadvantages of on-street parking. 5.00
- (c) Write the factors that affect the pedestrian safety. 2.00
- Q.4 (a) What are the major causes of road traffic accident? 3.00
- (b) Discuss some well-known traffic management measures. 4.50
- (c) Discuss the production and uses of (i) Pitch, (ii) Cut-back, and (iii) Emulsion. 4.50

SECTION B

- Q.5 (a) Discuss the role of transportation for the development of a country. 4.00
- (b) Write down the advantages and disadvantages of road transport. 4.00
- (c) What are the common elements of every transport system? Discuss them briefly. 4.00
- Q.6 (a) Explain the necessity and objects of highway planning. 4.00
- (b) What are the different types of road patterns? Discuss about the 'rectangular or block pattern'. 4.00
- (c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design a summit curve for a speed of 100 kmph so as to have an OSD of 470 m. 4.00
- Q.7 (a) What do you mean by 'Alignment' of a highway? Discuss the different requirements of an ideal alignment. 4.00
- (b) What is geometric design of highway? Write down the importance of geometric design. Explain the different elements of geometric design. 5.00
- (c) Write short notes on: (i) Right of way, (ii) Frontage road, and (iii) Camber. 3.00
- Q.8 (a) What do you mean by 'superelevation'? Write down the steps for practical design of superelevation. 4.00
- (b) Derive an expression for finding the extra widening required on horizontal curve. Write down the factors on which the design of widening depends. 4.00
- (c) The speeds of overtaking and overtaken vehicles are 70 and 40 kmph, respectively on a two-way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec², (i) calculate safe overtaking sight distance, (ii) mention the minimum length of overtaking zone, and (iii) draw a neat-sketch of the overtaking zone and show the position of the sign posts. 4.00

The End

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Heaven's Light is Our Guide
DEPARTMENT OF CIVIL ENGINEERING
 RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
 B.Sc. Engineering **THIRD** year **SIXTH SEMESTER** Examination, 2015

CE 351
Transportation Engineering

Full Marks: 70

Time: 3 Hours

- N.B.:-
- (i) Answer SIX questions, taking THREE from each section.
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 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data not given.

SECTION-A

- Q.1 (a) Explain the land use and transport feedback cycle. 2.00
 (b) Briefly explain the physical characteristics of road users and static characteristics of vehicles that affect the traffic performance. 6.67
 (c) Write short notes on (i) PCU (ii) TPF (iii) 60/70 grade bitumen. 3.00
- Q.2 (a) Define traffic volume and discuss the presentation system of traffic volume data. 3.67
 (b) Briefly discuss the production and uses of (i) Oxidized bitumen (ii) Cut-back and (iii) Emulsion. 4.50
 (c) Write the objectives of parking study and the name of different parking system. 3.50
- Q.3 (a) Discuss the importance of highway lighting. Draw the lighting layout on straight road. 3.67
 (b) What are the types of road intersections? Explain the grade separation with their advantages and disadvantages. 4.00
 (c) Write short notes on: (i) Skid (ii) Frontage road (iii) Camber and (iv) Right of way. 4.00
- Q.4 (a) Write the specific uses of (i) O & D study and (ii) Speed and delay studies. 3.67
 (b) Define road users. Briefly discuss various measures for the reduction in accidents rates. 4.00
 (c) Write the bad effect of noise and air pollution. Write the needs of traffic regulations. 4.00

SECTION-B

- Q.5 (a) What are the characteristics of road transport in comparison with other modes of transportation? 4.00
 (b) Explain the roles of transportation in rural development of Bangladesh. 3.67
 (c) Explain the necessity and objects of highway planning. 4.00
- align } Q.6 (a) What are the various ~~require~~ requirements of an ideal highway alignment? Discuss briefly. 3.00
 (b) Write the classification of road based on location and function. Explain the probable reasons hampering the road development in Bangladesh. 4.67
 (c) Calculate SSD for a design speed of 60 Km/h for two-way traffic on a single lane road. Assume $f = 0.35$ and $t = 2.5$ sec. 4.00
- Q.7 (a) Briefly discuss the function of transition curve and extra width provided on road. 3.67
 (b) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 125. A summit curve is to be designed for a speed of 80 Km/h so as to have an OSD of 450m. 4.00
 (c) Write short notes on (i) Over pass (ii) By-pass (iii) Fly-over (iv) Full clover leaf. 4.00
- Q.8 (a) Explain with sketches the method of eliminating camber and introduction of super elevation. 4.00
 (b) Design the rate of super-elevation for a curve of radius 300 m and speed of 75 Km/h. 4.00
 (c) Derive the expressions for finding the SSD at level and at grades. 3.67

CE 351

Transportation Engineering - I

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 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1(a) Briefly explain the physical characteristics of road users and static characteristics of vehicles that affect the traffic performance. 5.00
- (b) Draw a neat sketch of: (i) Collision diagram, (ii) Rotary intersection, and (iii) Land-use transport feedback cycle. 3.00
- (c) Explain briefly the roles of road users to protect young people from the epidemic of road injuries. 3.67
- Q.2(a) Write short notes on: (i) PCU, (ii) AADT, (iii) DHV, and (iv) SMS. 4.00
- (b) Write the name of parking facilities. Discuss briefly the various design factors for road lighting. 4.00
- (c) Write the objects and uses of origin and destination study. 3.67
- Q.3(a) Write short notes on: (i) Channelised road intersection, (ii) Grade separated intersection, and (iii) By-pass. 3.00
- (b) Write the objective of TSM and briefly discuss the some well-known traffic management measures. 4.00
- (c) Briefly explain the importance of sub-grade soil. Discuss the desirable properties of coarse aggregate for road construction. 4.67
- Q.4(a) Discuss the types and functions of: (i) Traffic signs, and (ii) Traffic signals. 4.00
- (b) Write short notes on: (i) Cut-back, (ii) Emulsion, and (iii) Road tar. 3.00
- (c) Define 'Road safety'. Write the objectives of various road safety measures. 4.67

SECTION-B

- Q.5(a) What are the characteristics of road transport in comparison with other modes of transportation. 4.00
- (b) Explain the roles of transportation in rural development of Bangladesh. 3.67
- (c) Explain the necessity and objects of highway planning. 4.00
- Q.6(a) Explain with sketches the various factors controlling the alignment of roads. 4.00
- (b) What are the factors on which the geometric design of highway depends? Explain briefly. 3.67
- (c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design a summit curve for a speed of 100 kmph so as to have an OSD of 470. 4.00
- Q.7(a) Write short notes on: (i) Kerbs, (ii) Right of way, (iii) Frontage road, and (iv) Camber. 4.00
- (b) Derive an expression for calculating the OSD on a highway. 3.67
- (c) Calculate the safe stopping sight distance for a design speed of 50 kmph for (i) two-way traffic on a two lane road, and (ii) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds. 4.00
- Q.8(a) Derive an expression for finding the extra widening required on horizontal curve. Write down the factors on which the design of widening depends. 4.00
- (b) What do you mean by superelevation? Enumerate the steps* for practical design of superelevation. 3.67
- (c) Calculate the extra width of pavement required on a horizontal curve of radius 700 m on a two lane highway, the design speed being 80 kmph. Assume wheel base $l = 6$ m. 4.00

The End

EMV

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Transportation Engineering-I

Full marks: 70

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SECTION-A

- Q.1 (a) Discuss the road user's characteristics and vehicular's characteristics that affect the traffic performance. 4.00
- (b) Write the objectives of traffic volume study. Explain with example, why 30th highest hourly volume is considered as DHV. 4.00
- (c) Explain briefly the various factors which affect the practical capacity of the traffic lane. Define PCU. 3.67
- Q.2 (a) Briefly discuss the functions of (i) Traffic sign, (ii) Traffic signal, (iii) Traffic island, and (iv) Road marking. 4.00
- (b) What are the types of road intersections? Explain the grade separation with their advantages and disadvantages. 5.00
- (c) Discuss the objectives of parking study. 2.67
- Q.3 (a) Draw symbols generally used in collision diagram. Explain the various measures adopted to prevent road accidents. 4.67
- (b) Explain the importance of highway lighting. Discuss various design factors in highway lighting. 4.00
- (c) Explain the terms: (i) Over pass (ii) By-pass and (iii) Fly-over. 3.00
- Q.4 (a) Explain the importance of study of sub-grade soil. Discuss the favorable properties of coarse aggregate for road construction. 4.00
- (b) Write short notes on: (i) Bitumen (ii) Pitch (iii) Cut-back and (iv) Emulsion. 4.00
- (c) Define TSM and discuss some traffic management measures. 3.67

$$S = 0.7 \cdot V_b + 6$$

SECTION-B

- Q.5 (a) Explain the roles of transportation in rural development of Bangladesh. 4.00
- (b) What are the characteristics of road transport in comparison with other modes of transportation? 4.00
- (c) Explain the necessity and objects of highway planning. 3.67
- Q.6 (a) Discuss various surveys that are carried out before planning a highway system for a given area. 4.00
- (b) Explain with sketches, how obligatory points control the highway alignment. 4.00
- (c) What are the objects of highway geometric design? List the various geometric elements to be considered in highway design. 3.67
- Q.7 (a) Write short notes on: (i) Slip and skid, (ii) Right of way, (iii) Frontage road, and (iv) Camber. 4.00
- (b) Derive an expression for finding the stopping sight distance at level and at grades. 3.67
- (c) The speeds of overtaking and overtaken vehicles are 70 and 40 kmph, respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec², (i) calculate safe-overtaking sight distance, (ii) mention the minimum and desirable length of overtaking zone, and (iii) draw a neat sketch of the overtaking zone and show the position of the sign posts. 4.00
- Q.8 (a) Define 'Total reaction time' and discuss the factors on which it depends. Explain 'PIEV' theory. 4.67
- (b) Derive an expression for OSD on a highway. 3.00
- (c) Explain with sketches the methods of eliminating camber and introduction of super elevation. 4.00

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 Transportation Engineering -I

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SECTION-A

- Q.1 (a) What do you mean by "good transportation system"? Explain the rules of transportation in rural development in Bangladesh. 5.00
- (b) What may be the probable reasons which are hampering the road development in Bangladesh? 3.00
- (c) What types of studies are carried out while planning a highway system for a particular area? 3.67
- Q.2 (a) Briefly explain the physical characteristics of road users and static characteristics of vehicles that affect the traffic performance. 6.67
- (b) Write short notes on: (i) PCU, (ii) DHV, (iii) TPF, (iv) TMS and (v) Traffic flow maneuver? 5.00
- Q.3 (a) Explain the various types and functions of (i) Traffic signs, (ii) Traffic signals & (iii) Road markings. 6.00
- (b) Name various types of road intersections. Explain grade separation, their advantages and disadvantages. What is a traffic rotary? 5.67
- Q.4 (a) Explain the importance of parking study. Discuss the various design factors in road lighting. 3.00
- (b) Draw symbols generally used in collision diagram. Explain the various measures that may be adopted to prevent road accidents. 5.00
- (c) Briefly discuss the some well-known traffic management measures suggested by Transportation System Management. 3.67

SECTION-B

- Q.5 (a) Define gradient. Briefly explain different types of gradient for highway. 4.00
- (b) Find the total width of pavement on a horizontal curve for a new state highway with a ruling maximum radius. Design speed is 80 kmph, width of road 7.0 m and wheel base is 6.1m. ? Sim(4.15) 3.67
- (c) Enumerate the steps for practical design of Superelevation. 4.00
- Q.6 (a) Derive an expression for finding the extra widening required on horizontal curve. 3.00
- (b) Explain the total reaction time of driver and factors by which it depends. Explain PIV theory. 4.00
- (c) Determine the safe overtaking sight distance on one-way and two-way traffic road for a design speed of 90 kmph. Assume other data. 4.7 (sim) 4.67
- Q.7 (a) Explain with sketches the various factors controlling the alignment of roads. 4.00
- (b) Derive an expression for finding the stopping sight distance at level and at grades. 3.67
- (c) An ascending gradient of 1 in 80 meets a descending gradient of 1 in 80. Determine the length of summit curve to provide a) SSD and b) OSD for design speed of 80 kmph. Assume all other data. ? 4.00
- Q.8 (a) Why is it essential to study the behavior of sub-grade soil? Discuss the favorable properties of the coarse aggregate for road construction. 4.67
- (b) Write short note on: i) Straight-run bitumen, ii) Pitch, iii) Cut-back and iv) Emulsion. 4.00
- (c) Explain the significance of the following tests: i) Los Angeles Abrasion test, ii) Solubility test of bitumen 3.00

CE 351
Transportation Engineering-I

Time: 3 Hours

Full marks: 70

- N.B:-
- (i) Answer any SIX questions, taking THREE from each section.
 - (ii) Figure in the margin indicate full marks.
 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data missing.

SECTION-A

- Q.1 (a) Discuss the road user characteristics and their effects in traffic performance. 4.00
(b) What are the roles of road users to protect young people from the epidemics of road injuries? 4.67
(c) Draw a neat sketch of: (i) Collision diagram (ii) full clover leaf (iii) Rotary intersection 3.00
- Q.2 (a) Write short notes on: (i) Traffic flow characteristics (ii) PCU (iii) Conflict points and (iv) 30th highest hourly volume. 4.00
(b) Explain the functions of: (i) Traffic signs (ii) Traffic signals (iii) Traffic islands and (iv) Road markings 4.00
(c) Discuss the educational measure to prevent road accident rates. 3.67
- Q.3 (a) Discuss the importance of highway lighting. Draw the lightening layout on straight road. 3.17
(b) Write short notes on: (i) Channelised intersection (ii) Grade separated intersection & (iii) Design capacity (Practical capacity) 4.50
(c) Explain briefly the various aspects investigated during parking studies. 4.00
- Q.4 (a) Define the term: (i) Pressure (ii) Stress (iii) Strength (iv) Hardness and (v) Toughness. 2.50
(b) Write short notes on: (i) Straight-run bitumen (ii) Pitch (iii) Cut-back and (iv) Emulsion 6.00
(c) Explain the significance of the following tests: (i) Los Angeles Abrasion test of aggregate (ii) Solubility test of bitumen. 3.17

SECTION-B

- Q.5 (a) What are the characteristics of road transport in comparison with other modes of transportation? 4.00
(b) Explain the rules of transportation in rural development in Bangladesh. 3.67
(c) Planning is the prerequisite for construction of highway. Why? Write the name of various road patterns commonly in use. 4.00
- Q.6 (a) What are the various requirements of an ideal highway alignment? Discuss briefly. 3.00
(b) Explain obligatory points. With sketches, discuss how these control the alignment. 4.00
(c) Discuss various surveys that carried out before planning a highway system for a given area. 4.67
- Q.7 (a) What are the factors on which the geometric of highways depends? Explain briefly. 4.00
(b) Write short notes on: (i) Slip and skid (ii) Camber (iii) Frontage road and (iv) Right of way. 4.00
(c) Calculate the safe stopping sight distance for design speed of 50 kmph for (i) two-way traffic on a two lane road (ii) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds. 3.67
- Q.8 (a) Derive an expression for calculating the overtaking sight distance (OSD) on a highway. 4.00
(b) Derive an equation for the super-elevation required if the coefficient of lateral friction is 'f'. 3.67
(c) Explain with the aid of neat sketches the methods of eliminating camber and introduction of super elevation. 4.00

CE 351
Transportation Engineering - I

Full Marks: 70

Time: 3 Hours

- N.B.:
- (i) Answer SIX questions, taking THREE from each section.
 - (ii) Figure in the margin indicates full marks.
 - (iii) Use separate answer script for each section.
 - (iv) Assume reasonable value for any data missing

SECTION-A

- Q.1(a) What are the different modes of transportation? Explain the necessity and objects of highway planning. 3.50
- (b) Classify the road based on function and location. Briefly discuss the characteristics of road transportation. 3.50
- (c) Calculate the additional length of metalled and unmetalled road from the following data: 4.67
- (i) Total area = 25,000 Km² (ii) Agricultural and developed area = 7200 Km²
 - (iii) Existing metalled road = 700Km (iv) Existing unmetalled road = 1100Km
 - (v) Length of railway = 200 Km (vi) Number of towns and villages are as:
- | | | | | | |
|-------------------------|-------|-----------|-----------|----------|------|
| Population range | >5000 | 2000-5000 | 1000-2000 | 500-1000 | <500 |
| No. of towns & villages | 14 | 85 | 250 | 500 | 1300 |
- Q.2(a) Briefly explain the mental characteristics of road user and dynamic characteristics of vehicle that affect the traffic performance. 3.67
- (b) Draw the basic traffic maneuvers. What are the factors that affect the capacity of traffic lane? Describing the parking facilities. 4.00
- (c) Define DHV and TPF. Three cars travel over a 100m section of a highway at constant speed of 20, 22 and 25 m/sec. Calculate the TMS and SMS for this section. ? 4.00
- Q.3(a) Define gradient. Briefly explain different types of gradient for highway. 4.00
- (b) What factors does the stopping sight distance depend? ? 3.67
- (c) Compute the minimum sight distance required to avoid a head on collision of two buses approaching from the opposite directions. The speed of both the buses is 70 kmph. Assume a total perception and break reaction time of 2.5 seconds. Coefficient of friction is 0.4 and break efficiency is 50%. 4.00
- Q.4(a) Explain briefly different vehicular characteristics which affect the road design. 3.67
- (b) Explain various types of signals and their functions. How signal timings are decided? ? 4.00
- (c) What are the causes of traffic accidents? How these accidents can be minimized? 4.00

SECTION-B

- Q.5(a) Explain briefly the objects and scope of traffic engineering. 3.00
- (b) Explain the importance of traffic parking. Compare off-street with curb parking. 4.67
- (c) Write short notes on: (i) PCU (ii) DHV (iii) Practical capacity (iv) Design of rotary. 4.00
- Q.6(a) Define obligatory points. Explain with sketches how obligatory points control the road alignment. 4.00
- (b) Explain briefly the various stages of work for a new highway project. 3.67
- (c) Write short notes on (i) Slip (ii) Shoulder (iii) Sight distance and (iv) Super elevation. 4.00
- Q.7(a) Where and why transition curve and extra widening are provided on road pavement? 4.00
- (b) Derive an expression for calculating the O.S.D. on a highway. What do you mean by overtaking zone? 5.00
- (c) An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 100 kmph so as to have an O.S.D. of 470 m. 2.67
- Q.8(a) Explain in details the road markings commonly used. 4.00
- (b) Explain grade separation, their advantages and disadvantages. 4.00
- (c) What are the objects of highway lighting? Discuss various design factors in road lighting. 3.67

Heaven's Light is Our Guide
Rajshahi University of Engineering and Technology
Department of Civil Engineering
Class Test on CE 3205

Full Marks: 20

Time: 20 mins.

- Q. 1. Write short notes on: (i) Skid and slip (ii) Camber (iii) Kerbs (iv) Reaction time (v) SSD. 10
Q. 2. Calculate the safe stopping sight distance for design speed of 50 kmph for (i) two-way traffic on a two lane road, and (ii) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds. 10

Class Test on CE 3205

Full Marks = 20

Time 30 minutes

- Q.1 Explain the needs of traffic regulations and discuss the different phases of traffic regulations. (7)
Q.2 Discuss the various devices used for traffic controls. (7)
Q.3 Discuss the well-known traffic management measures. (6)

Class Test on CE 3205

Full Marks = 20

Time 30 minutes

- Q.1 Define the terms: (i) Traffic (ii) Transport (iii) Road user (iv) Skid (v) Slip (vi) PCU (vii) ADT (viii) AADT (ix) DHV and (x) Traffic maneuvers. (10)
Q.2 Discuss briefly the Road User and Vehicular Characteristics that influence the road safety. (10)

Class Test on CE 3205

Full Marks = 20

Time 30 minutes

- Q.1 Define the term: (i) Parking (ii) Road accident (iii) Pedestrian and (iv) Ribbon development. (4)
Q.2 Briefly discuss the on-street parking and write the advantages and disadvantages of on-street parking. (6)
Q.3 Where and why parking is prohibited. Briefly discuss the factors that affect the pedestrian safety. (10)

Class Test on CE 3205

Full Marks = 20

Time 30 minutes

- Q.1 Discuss briefly the various factors which affect the road user characteristics & their influence in performance. (6)
Q.2 Explain briefly the significance of static characteristics of vehicles in the road design. (4)
Q.3 Distinguish between the (i) Skid & Slip (ii) Running speed & Travel speed (iii) Fixed delays & Operational delays. (6)
Q.4 Calculate the TMS and SMS for five spot speeds of 38, 42, 46, 50 and 54 kmphr. within a specified section. (4)

Heaven's Light is Our Guide
Rajshahi University of Engineering and Technology
Department of Civil Engineering
Class Test on CE 3205

Full Marks: 20

Time: 20 mins.

- Q. 1. Calculate the safe stopping sight distance for design speed of 50 kmph for (a) two-way traffic on a two lane road (b) two-way traffic on a single lane road. Assume coefficient of friction as 0.37 and reaction time of driver as 2.5 seconds. 10
Q. 2. Derive an expression for finding the SSD at level and at grades. 10

Heaven's Light is Our Guide
Rajshahi University of Engineering and Technology
Department of Civil Engineering
Class Test on CE 351

Full Marks: 20

Time: 20 mins.

- Q. 1. What are the characteristics of road transport in comparison with other systems? 10
Q. 2. Explain with sketches the various factors controlling the alignment of roads. 10