B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023
TRANSPORTATION ENGINEERING II
Part - I
Answer each part in separate answer script

Time: 3 Hours   Full Marks: 60
Answer brief & to the point. Assume standard value for any parameter, if required

1. Write short notes on   [CO1]   4 x 3
    i.   External Cordon Line
    ii. Parking statistic
    iii. Causes of road accidents

2. Illustrate the following –   [CO2]   4 x 3
    i.   Along the road marker
    ii. All red period in a signal system
    iii. Mandatory traffic signs

3. Calculate the average flow, journey speed and running speed of the two directions of   [CO1]   10
    the section BD of a street from the following moving car study data –

Section	Length (m)	Time Recorded (sec)	Vehicles met with		
			Opposite Direction	Overtaking	Overtaken
AB	500	152	25	8	6
B	---	15	8	--	--
BC	600	172	31	5	2
C	---	14	7	--	--
CD	400	132	22	6	9
D	---	20	10	8	--
DC	400	154	28	6	4
C	---	12	4	--	--
CB	600	160	55	6	7
B	---	18	6	--	--
BA	500	145	45	7	2

4. Illustrate about the following –   [CO1]   8
    i.   components of an off street parking facility
    ii. automatic methods of speed study

5. Name the types of conflicts observed in an at grade intersection and calculate the   [CO2]   8
    change in category wise conflicts expected in case the two-way flow of two mutually
    perpendicular two-lane roads is changed to one-way flow in both directions.

6. Draw the possible phase diagrams and compute the design optimum signal cycle time   [CO2]   10
    for an at grade intersection of 2nos. 2-Lane 2-way mutually perpendicular roads with
    the following data -
    Pedestrian Green Time and crossing speed are 6 secs and 1m/s respectively. Average
    lane width 3.5m. Amber time and starting delay are 4sec and 3sec respectively. No
    accumulation of vehicles demanding clearance red. Saturation flow for 1 and 2 lane
    approaches are 1890 PCU/Hr and 3675 PCU/Hr respectively. Right turning radius is
    25m. Traffic data is as recorded below with E, W, N, S indicating four directions.

From	N			S			E			W		
To	E	S	W	W	N	E	S	W	N	N	E	S
PCU	20	232	33	19	253	46	18	237	42	17	247	34

Form A: Paper-setting Blank   *Ref No. Ex/CE/PC/B/T/324/2023(S)*

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SECOND SEMESTER SUPPLEMENTARY EXAM 2023
SUBJECT: TRANSPORTATION ENGINEERING II
(Name in full)

PAPER ××××

Time: Three hours   **Full Marks =100**

(60 marks for part I and 40 Marks for part II)
Use a same Answer-Script for each part

No. of   *Part –II*   CO   Marks
Question

1) Answer question number 1 and question number 2,
2) Assume reasonable values of data if it is not supplied,
3) Answer the Part 1 and Part 2 separately.
4) There is no need of any code etc. for answering Part- II,
5) In the cases where excess number of questions will be answered exceeding the required number of question/s, the first required number of question/s will be evaluated only.
6) All notations used in this questions for their conventional meanings.

Sl. No.   **Question**

Answer any one between 1 (a) to 1 (d)

1 (a)	Write short notes on ballast cushion.	[CO4]	[2]
1 (b)	Using a sleeper density of 'M+6', find out the number of sleepers required for constructing a B. G. railway track 640 m long.	[CO4]	[2]

Answer any one between 1 (c) to 1 (d)

1 (c)	What are the principal functions of ballast in a permanent way?	[CO4]	[3]
1 (d)	Explain the conditions when ballast may be exempted in making of 'permanent railway track'.	[CO4]	[3]

Answer any one between 1 (e) to 1 (f)

1 (e) What will be the steepest gradient on a straight track when the following   [CO4]   [5]
conditions exist, for a train having 20 wagons when Weight of each wagon = 18
tonnes. Speed of the train = 60 kmph,
Rolling resistance of wagon = 2.5 kg/tonnes, Rolling resistance of locomotive =
3.0 kg/tonnes, Weight of the locomotive = 120 tonnes, Tractive effort of
locomotive = 12 tonnes,
Given, resistance depending upon the speed = 0.00008 wv, atmospheric
resistance = 0.0000006 wv^2 and resistance due to gradient = (w/g) where all
notations stand for their conventional meanings.

1 (f) Draw a schematic cross section of a railway permanent track with proper   [CO4]   [3+2]
labeling. Briefly describe the prime functions of the sleeper of the railway
permanent track.

Answer all of the following MCQ between 1 (g) to 1 (p)
• *Each of the MCQ (within all of the MCQ in this part) is mandatory. Each MCQ is carrying 1 mark.*
• *Some MCQ question may have more than one correct alternative, so examine each alternative of each MCQ before giving your choice of the concerned MCQ.*
• *Giving all alternatives of any MCQ as your choices as correct answers of the concerned MCQ, will lead to zero marks for the concerned MCQ.*

1 (g) On curved track super elevation is maintained by   [CO4]   [1]
(A) Rail
(B) Sleeper

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Use a same Answer-Script for each part

	(C) Ballast		
	(D) All the above		
1 (h)	Selection of gauge depends on	[CO4]	[1]
	(A) Cost of construction		
	(B) Physical features of the vehicle		
	(C) Volume and nature of the traffic		
	(D) All the above		
1 (i)	The provision for coning of wheels is possible only when	[CO4]	[1]
	(A) Wheel is made up of tungsten		
	(B) Tilting of rail is there		
	(C) Adzing of sleepers ate there		
	(D) All the above		
1 (j)	The advantage/s for coning of wheels is/ are	[CO4]	[1]
	(A) To prevent wear and tear of vehicle bogies		
	(B) To provide possibility for lateral movement		
	(C) To prevent bogies from slipping		
	(D) All the above		
1 (k)	The following rail section has been made first	[CO4]	[1]
	(A) Bull headed rail		
	(B) Double headed rail		
	(C) Flat footed rail		
	(D) None of the above		
1 (l)	Heavy chains and keys are required for	[CO4]	[1]
	(A) Bull headed rail		
	(B) Flat footed rail		
	(C) Double headed rail		
	(D) None of the above		
1 (m)	Straightening of bent rails are comparatively difficult for	[CO4]	[1]
	(A) Bull headed rail		
	(B) Flat footed rail		
	(C) Double headed rail		
	(D) None of the above		
1 (n)	The various important factors to be considered in deciding the weight of rail to be used are:	[CO4]	[1]
	(A) Maximum permissible wear at side of rail		
	(B) The axle load and nature of traffic		
	(C) The wheel gauge concerned		
	(D) None of the above		
1 (o)	The wear of the rails occur mainly due to:	[CO4]	[1]
	(A) Fast speed of the moving vehicles		
	(B) Heaviness of the axle load		
	(C) Fluctuation of temperatures between day and night		
	(D) All of the above		
1 (p)	Maximum design life is expected from	[CO4]	[1]
	(A) Concrete sleeper		
	(B) Metal sleeper		
	(C) Wooden sleeper		
	(D) (A) and (B) of the above		

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(60 marks for part I and 40 Marks for part II)
Use a same Answer-Script for each part

Answer any one between 2 (a) to 2 (b)

2 (a)	Why the concept of average speed is important?	[CO5]	[2]
2 (b)	Among 'momentum gradient' and 'pusher gradient', which one has the scope to be used frequently in mountainous region and why? Support your answer with logic.	[CO5]	[2]

Answer any one between 2 (c) to 2 (d)

2 (c)	Explain the term-"ruling gradient"	[CO5]	[3]
2 (d)	What are differences between overturning and derailment?	[CO5]	[3]

Answer any one between 2 (e) to 2 (f)

2 (e)   A 5° curve diverges from a 3° main curve in opposite direction in a layout of B. G. yard. If the speed on the branch line is limited to 24 kmph, determine the restricted speed on the main line.   [CO5] [5]

2 (f)   For a country like India, which situations may be evolved as problematic for the geometric design for railway?   [CO5] [5]
(A) Geometric design for railway in Darjeeling,
(B) Geometric design for railway in Pokhran,
(C) Geometric design for railway in Jaldapara,
(D) Geometric design for railway in Cherrapunji.

Answer all of the following MCQ between 2 (g) to 2 (p)
• *Each of the MCQ (within all of the MCQ in this part) is mandatory. Each MCQ is carrying 1 mark.*
• *Some MCQ question may have more than one correct alternative, so examine each alternative of each MCQ before giving your choice of the concerned MCQ.*
• *Giving all alternatives of any MCQ as your choices as correct answers of the concerned MCQ, will lead to zero marks for the concerned MCQ.*

2 (g)   Gradients are provided on tracks mainly to   [CO5] [1]
(A) Reach the various stations situated at different areas
(B) Reduce the cost of earth work
(C) Helping in proper drainage from the track
(D) All the above

2 (h)   Mainly _____ types of gradients are observed in case of railway geometric design. The blank should be filled by   [CO5] [1]
(A) Two
(B) Three
(C) Four
(D) None the above

2 (i)   The momentum gradient is being represented here (in the following schematic diagram) by the number   [CO5] [1]

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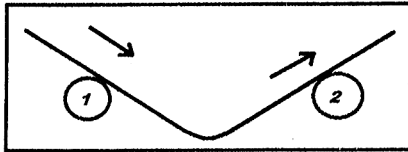**SUBJECT: TRANSPORTATION ENGINEERING II**
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(A) 2
(B) 1
(C) Both 1 and 2
(D) None the above

2 (j)   Helper gradient is synonymous with   [CO5]   [1]
(A) Ruling Gradient
(B) Momentum Gradient
(C) Pusher Gradient
(D) Assistant Gradient

2 (k)   As per IS recommendation, the compensation for curvature for BG, is   [CO5]   [1]
(A) 0.05% per degree of the curve
(B) 0.04% per degree of the curve
(C) 0.03% per degree of the curve
(D) being determined depending upon the situation

2 (l)   The speed of train depends upon   [CO5]   [1]
(A) The strength of the vehicle
(B) The strength of the track
(C) The power of locomotive
(D) All of the above

2 (m)   The safe speed to negotiate the curves safely, depends upon   [CO5]   [1]
(A) The nature of rail
(B) The gauge of the concerned track
(C) The radius of the concerned curve
(D) None of the above

2 (n)   Super elevation is being provided mainly to   [CO5]   [1]
(A) Counteract the effect of centrifugal force
(B) Counteract the effect of centripetal force
(C) Counteract the effect of frictional force
(D) All of the above

2 (o)   The equilibrium cant is being provided on the basis of: [CO5]   [1]
(A) Equilibrium speed
(B) Highest speed
(C) Average speed
(D) requirement of the actual situation

2 (p)   Maximum limit of super elevation for B.G. is   [CO5]   [1]
(A) 7.6 Cm
(B) 10 Cm
(C) 16.5 Cm
(D) (B) and (C) of the above

End of Questions