

Ref. No.: Ex/CE/PC/B/T/324/2022

**B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2022
TRANSPORTATION ENGINEERING II**

Part - I

Answer Both Part I and Part II in the Same Answer Script

Time: 3 Hours

Full Marks: 60

Answer brief & to the point. Assume standard value for any parameter, if required

Group A: Short Answer type Questions to be answered in brief. 2 x 10

1. Answer all the following questions
 - a. Name the two reports normally used for accident data collection
 - b. Name any two major ill effects of parking
 - c. How many parking spaces are desired for a 450-seater movie?
 - d. What is Weaving Length?
 - e. What are the methods of representing O&D survey data?
 - f. What type of delay is observed for a car and a bus when the car is following the bus on a single lane road and the bus stops at a stoppage?
 - g. At the intersection of 2nos. 7m wide 2-lane roads with ssd of 60m for each approach, what is the hypotenuse length of a clear sight triangle?
 - h. For an intersection with each road being 7m wide, pedestrian green time being 7secs and pedestrian walking speed being 7m/min, what is the all red period for pedestrian phase?
 - i. Draw neat sketches of 4-legged skew staggered intersection
 - j. Which of the stages of parking operation are not done manually in automated parking plaza?

Group B: Write Short Note on / Explain any Four of the Following 4 x 5

2. Accident Data Presentation
3. Components of Off-street Parking facility
4. Delay and its Type
5. Trumpet Interchange (with neat labelled sketch showing all relevant routes and conflicts)
6. Phase Diagram for a 4-phase signal at the intersection of 2nos. 2-Lane 2-Way Roads
7. Automatic Method of Volume Study

Group C: Answer Any Four of the Following 4 x 5

8. The Motor vehicle consumption in a city is 5,082 million litres, there were 3114 fatal motor vehicle accidents and 355,799 non-fatal motor vehicle accidents; 6,721,049 motor vehicle registrations and an estimated population of 18,190,238. Kilometre of travel per litre of fuel is 12.42 km/litre. Calculate registration death rate, population death rate and accident rate per vehicle km.
9. Through neat labelled sketches describe the change in conflict pattern if one road of the intersection of 2-nos. 2-lane, 2-way road is changed to 1-way.

10. Design the radius and carriageway width of rotary intersection of one standard 4-lane 2-way street with another standard 2-lane 2-way street considering the freeway design speed of 60Kmph
11. The parking survey data collected from a parking lot by license plate method (Registration numbers as recorded) is as shown below. Find the Parking Load, Average Occupancy, Parking Volume, Average Turnover, and Average Duration of the parking lot.

Time (in min)	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay8	Bay9	Bay10
0-10	1864	4643	2262	5489	3961	9891	0184	7219	4903	9636
10-20	1864	4643	2262	5489	3961	-	0184	7219	4903	9636
20-30	1864	4643	2262	5489	3961	-	0184	7219	4903	9636
30-40	1864	9429	2262	5489	3961	7611	2670	7219	4903	9636
40-50	1864	2762	0866	0134	-	7611	2670	7219	4124	4680
50-60	1864	2762	7084	0134	-	7611	2670	7219	4124	4680

12. Design an optimum 4-phase signal system for at grade intersection of 2nos. 2-Lane 2-way roads with the following data - For each phase Amber time is 3sec, starting delay is 2sec and clearance read is 10sec. Saturation flow for 1-lane and 2-lane approaches are 1890 PCU and 3675 PCU respectively. 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

13. From the following data of moving car study determine the average flow, journey time and running time for the direction AC

Section	Length (m)	Time Recorded (sec)	Vehicles met with		
			Opposite Direction	Overtaking	Overtaken
AB	500	152	25	8	6
B	---	15	08	--	--
BC	600	172	31	5	2
CB	600	160	55	6	7
B	---	18	06	--	--
BA	500	145	45	7	2

**B.E. CIVIL ENGINEERING THIRD YEAR
SECOND SEMESTER EXAM 2022
SUBJECT: TRANSPORTATION ENGINEERING-II**
(Name in full)

PAPER ××××

Full Marks =100

Time: Three hours

(60 marks for part I and 40 Marks for part II)

Use a **same** Answer-Script for each part

No. of
Question

Part –II

Marks

- **Maintain neatness.**
- **Each of the MCQ (within all of the MCQ in this part) is mandatory.**
- **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.**
- **All the other questions (apart from the MCQ questions in this part) are mandatory.**
- **Assume reasonable data if it is not supplied.**
- **Do not *separate Two Parts*. All drawings-must be drawn by pencil.**
- **No code etc. will be needed to answer the questions of this part.**

Instructions (with examples) for giving answers to MCQ in this part:

Suppose you have to answer following MCQ in your answer script:

MCQ 1) Name of the present prime minister of the India

- a) Jawaharlal Nehru,
- b) Narendra Modi,
- c) Manmohan Singh,
- d) None of the above.

MCQ 2) Virat Kohli is

- a) Captain of the Indian Cricket team,
- b) Husband of Anuska Sharma,
- c) President of the BCCI,
- d) All of the above.

MCQ 3) Within the last few months

- a) Russia attacked Ukraine,
- b) The economic condition of Srilanka became very bad,
- c) China attacked India,
- d) All of the above.

.....

Then during giving answer in your answer scripts, you have to give the answers of the above MCQ in the following style only:

Part –II

Answer to MCQ 1) : b) Narendra Modi,

Answer to MCQ 2) : b) Husband of Anuska Sharma,

Answer to MCQ 3) : a) Russia attacked Ukraine,

b) The economic condition of Srilanka became very bad,

.....

Note:

(A) In MCQ 2, if anyone give alternative "a)" as one of the correct alternative, he/ she is wrong as Virat Kohli was (not "is") Captain of the Indian Cricket team. So, read each word of the alternatives very carefully before giving your answer.

(B) In MCQ 3, if anybody chooses either alternative "a)" or alternative "b)" as the correct alternative, he/ she will get 0.5 marks as there were two correct alternatives.

(C) There is no negative marking for choosing wrong alternative as your choice in any MCQ.

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Use a **Same** Answer-Script for each part

Group- A

Choose the correct alternative/ alternatives from the following 20 MCQ:

- MCQ (1) Adopting the coning of wheel, it is possible to 1
(a) Keep the thread of wheel at dead center with respect to the head of the rail (in general)
(b) Keep the gauge accurate throughout
(c) Distribute the weight of the bogies and the locomotives more evenly
(d) All of the above
- MCQ (2) The advantage/s of the coning of wheels is/ are 1
(a) To reduce the wear and tear action
(b) To prevent the rail from slipping
(c) To distribute the weight of the bogies and the locomotives more evenly
(d) All of the above
- MCQ (3) In respect of the straightening of bent rails, it is always advantageous to use 1
(a) Flat footed rails
(b) Bull headed rails
(c) Double headed rails
(d) All of the above
- MCQ (4) The parameter/s which is/ are very important in deciding the weight of the rail (which is to be used), is/ are: 1
(a) Cost of construction,
(b) The gauge of the track,
(c) Sleeper density under the rail,
(d) All the above,
- MCQ (5) The prescribed limit of wear (in %), beyond which the concerned rail must be replaced, is 1
(a) 4%
(b) 5%
(c) 7%
(d) None of the above
- MCQ (6) On the basis of location, wear may occur mostly in _____ places/ situations, the blank space should be filled by 1
(a) Three
(b) Four
(c) Five
(d) Six
- MCQ (7) Some of the method/s to reduce the wear is/ are: 1
(a) Use of special alloy steel
(b) Maintenance of correct gauge
(c) Use of bearing plate
(d) All 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

- MCQ (8) Using "check rail", the rail which is/ are mainly saved: 1
(a) Inner Rail
(b) Outer Rail
(c) Both the rail
(d) Any one of outer or inner rail depending upon the situation
- MCQ (9) Cast iron sleepers are of _____ types, the blank space should be filled by: 1
(a) Three
(b) Four
(c) Five
(d) Six
- MCQ (10) Concrete sleepers are advantageous in respect of the following point/s: 1
(a) They have maximum design life
(b) Their high weight provides greater stability to the track
(c) They are not affected by moisture
(d) All of the above
- MCQ (11) A ballast with gauge size 3.8 cm, is considered as very suitable for: 1
(a) Wooden sleeper tracks
(b) Steel sleeper tracks
(c) Under switches and crossings
(d) None of the above
- MCQ (12) For all calculation purposes, if no related data is available, the value of the coefficient of friction (for determining the hauling capacity), should be taken as 1
(a) 0.1
(b) 0.2
(c) 0.3
(d) Any one of the above
- MCQ (13) Rolling resistance include/s 1
(a) Atmospheric resistance
(b) Wind Resistance
(c) Resistance due to gradient
(d) All of the above
- MCQ (14) The maximum permissible speed on a curve, may be chosen from some 1
specific methods/ alternatives depending upon the situation, the highest
possible number of such specific methods / alternatives, is
(a) Two
(b) Three
(c) Four
(d) None of the above

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- MCQ (15) When ruling gradient is severe for a long stretch, it is better to use/ adopt 1
(a) Grade compensation (maintaining a frequency) of the ruling gradient within the particular stretch
(b) A momentum gradient
(c) A helper gradient
(d) None of the above
- MCQ (16) The safe speed of the train to negotiate curves safely, depends upon 1
(a) The radius of the curve
(b) The presence or absence of the circular curve
(c) The wheel gauge
(d) All of the above
- MCQ (17) A momentum gradient is always 1
(a) A falling gradient steeper than ruling gradient
(b) A rising gradient steeper than ruling gradient
(c) A falling gradient milder than ruling gradient
(d) A rising gradient milder than ruling gradient
- MCQ (18) For BG, the cant deficiency is 1
(a) 7.6 cm when maximum train speed is not limited within 100 Km
(b) 5.1 cm when maximum train speed is not limited within 100 Km
(c) 7.6 cm when maximum train speed is limited within 100 Km
(d) 5.1 cm when maximum train speed is limited within 100 Km
- MCQ (19) The speed of the train depends upon 1
(a) The power of the locomotive
(b) The strength of the track
(c) The effective area of the bogies and the locomotive exposed to the wind
(d) All of the above
- MCQ (20) A good ballast requires: 1
(a) Enough soakage
(b) Resistance to abrasion and weathering
(c) Disintegration properties
(d) All of the above

Group- B

Answer all the following questions:

- (21) Derive the expression of the minimum ballast cushion. 3
- (22) If a B.G. track is laid with welded rails (when two successive rails have been welded) using a sleeper density of $M+6$, find out the number of sleepers required for constructing a railway track 768 m long. 3

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- (23) What will be the steepest gradient on a straight track when the following 6
conditions exist, for a train having 16 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.
- (24) What is the equilibrium cant on a 3 degree MG curved track if 15 trains, 12 3
trains, 7 trains and 3 trains run at speeds of 55 kmph, 60 kmph, 75 kmph
and 80 kmph respectively?
- (25) A 6° curve diverges from a 3° main curve in opposite direction in a layout of 5
B. G. yard. If the speed on the branch line is limited to 24 kmph., determine
the restricted speed on the main line.

End of the part –II of the question.