

Subject : Highway Engineering

Class : Third year

Hours : 2 hrs (Theoretical) , 2hrs (Practical)

Objectives :

The student must learn the geometrical engineering design of highways , The structural design of flexible & rigid pavements . The student must learn also, All the site works that may be needed for road construction & maintenance of pavements . The student can be able to accomplish the important tests of soil layers , asphalt and concrete pavements as well as he will have an important information about airport & railway engineering .

| Week | Syllabus |
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| 1 | Highways classification according to their functions , locations, and pavements types |
| 2 | Highway alignments and alternatives , points of inflections , topography terrain maps , cross-section elements , profiles , and horizontal and vertical curves |
| 3 | Horizontal curves , angle of inflections , middle ordinates , external distance , centrifugal forces , minimum radius and design speed . |
| 4 | Spiral curves and super elevation concepts . |
| 5 | Vertical curves , crest and sag curves , under crossing clear distance , minimum length and grades . |
| 6 | Sight distances , stopping and passing , at grade intersection , at vertical curves , relation between length of curve and required sight distance and between middle ordinate distance . |
| 7 | Traffic volumes , counting , traffic volume correction factors , level of service (LOS) , AADT, ADT , DHV , |
| 8&9 | Traffic loads ,equivalent single axle load (ESALs) , tandem axle load, tridem axle loads , load damage factor , growth factor , stresses on pavements . |
| 10&11 | Design of flexible pavement, pavement layers , charts for design |
| 12&13 | Design of rigid pavement, pavement layers , charts for design |
| 14 | Railway cross section elements and embankments , specifications |

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| 15 | Airports orientations , runway and taxiway specifications , signals and marking . |
| 16 | Sub-grade works , grading , cut and fill sections , soil classification (AASHTO , UCS) , Leveling and compactions |
| 17 | Sub-base works , stockpiles , specifications , spreading , leveling and compactions |
| 18&19 | Base works , macadam and untreated base , stabilized base (bitumen , lime , cement treated base) . |
| 20 | Prime and tack coats, specifications and applications . |
| 21 | Asphalt plants (types and units) , crushers |
| 22 | Asphalt mixtures (Hot and Cold) , specifications |
| 23 | Job mix , preparations in laboratory and plants , applications in the fields |
| 24&25 | Asphalt pavement constructions , placing , spreading , pavers , rollers , field tests , leveling and thickness controlling . |
| 26 | Super pave asphalt , specifications , aggregate grading , binder standards (PERFORMANCE GRADING PG) , new tests of bitumen and mixtures . |
| 27&28 | Rigid pavement , layers , fixed and slip forms , joints and reinforcing , control of leveling , and finishing |
| 29 | Drainage systems , culverts , siphon , ditches and filters |
| 30 | Highway furniture and control devices |

References:

- 1. Road design manual / 2007**
- 2. A Policy on geometric design of highway and streets / 2001**
- 3. The handbook of highway engineering / 2006**
- 4. Super pave fundamentals , FHWA , NHI # 131053**
- 5. Internet's references**