BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH   SEMESTER : III
BRANCH: SER   SESSION : MO/19

SUBJECT: SR614 TURBULENCE MODELING IN CFD

TIME: 3 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Describe the characteristics of wall-bounded shear flow.   [5]
Q.1(b)   Discuss on the variance, r.m.s. and correlation functions in time and space.   [5]

Q.2(a)   Explain the Boussinesq eddy-viscosity hypothesis.   [5]
Q.2(b)   Write short notes on Reynolds and Favre (mass) averaging of a flow variable φ.   [5]

Q.3(a)   Briefly discuss about the molecular transport of momentum.   [5]
Q.3(b)   Describe the Baldwin-Lomax zero equation / algebraic turbulence model.   [5]

Q.4(a)   Describe the Spalart-Allmaras one-equation turbulence model.   [5]
Q.4(b)   Discuss on the implementation of boundary conditions for Spalart-Allmaras and k-ω turbulence models.   [5]

Q.5(a)   Briefly discuss on the Large Eddy Simulation (LES), its advantages and limitations.   [5]
Q.5(b)   Write short notes on Smagorinsky SGS model and Direct Numerical Simulatoin (DNS).   [5]

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