



## EDITORIAL BOARD

### **Editor-in-Chief:**

**Prof. Dr. Bassam G. Rasheed**

*Laser and Optoelectronics Eng. Dep., Al-Nabrain Univ., Baghdad, Iraq.*

### **Editorial Board:**

**Prof. Dr. Riyadh Al-Mahaidi**

*Structural Engineering, Swinburne University of Technology, Australia.*

**Prof. Dr. Raghad Mofeed Mohamed Ibrahim**

*Faculty of Engineering, Cairo University, Cairo, Egypt.*

**Prof. Dr. Mohamad Khalil**

*Faculty of engineering, Lebanese University, Lebanon*

**Assist. Prof. Dr. Manal Jamil Al-Kindi**

*Electronic and Communications Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

**Assist. Prof. Dr. Ahmed Waheed Mustafa**

*Mechanical Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

**Assist. Prof. Dr. Alaa Hussein Abed**

*Civil Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

**Assist. Prof. Dr. Irfan S. Al-Anbagi**

*Faculty of Engineering and Applied Science, University of Regina, Canada*

**Assist. Prof. Dr. Hussein Znad**

*Chemical Engineering Department, Curtin University, Australia*

**Assist. Prof. Dr. Mohammed Qasim Abdul Ghafoor Al Ani**

*Architecture Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

**Assist. Prof. Dr. Saad H. Ammar**

*Chemical Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

**Assist. Prof. Dr. Auns Qusai Hashim Al-Neami**

*Biomedical Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

### **Managing Editor**

**Dr. Ahmed Riedh A. Al-Hamaoy**

*Laser & Optoelectronics Eng. Dep., Al-Nabrain Univ., Baghdad, Iraq.*

### **Editorial Secretary**

**Assist Prof. Dr. Omar Shamal Farhan**

*Civil Eng. Dep., Al-Nabrain University, Baghdad, Iraq.*

### **Linguistic Reviewer**

**Sheelan S. Kamal**

*MA English Literature. University of Massachusetts Boston, USA.*

*The views expressed in this issue are those of the authors and not necessarily of the Editorial Panel*





## **ADVISORY BOARD**

- 1- **Prof. Dr. Dermot Brabazon**  
*School of Mechanical and Manufacturing Engineering, DCU, Ireland*
- 2- **Prof. Dr. Kevin Chen**  
*Department of Electrical and Computer Engineering, University of Pittsburgh, USA*
- 3- **Prof. Dr. Ravi Kant Soni**  
*Indian Institute of Technology Delhi, Hauz Khas, New Delhi, India*
- 4- **Prof. Dr. Qassim. J. Slaiman**  
*Dep. of Chemical Engineering, Al-Nahrain University, Iraq*
- 5- **Prof. Dr. Albert E. Yousif**  
*Dep. of Biomedical Engineering, Al-Nahrain University, Iraq*
- 6- **Prof. Dr. F. M. Al Naima**  
*Dep. of Electronic and Communications Engineering, Al-Mamon University, Iraq*
- 7- **Prof. Dr. Waleed K. Hamoudi**  
*Dep. of Applied Science, University of Technology, Iraq*
- 8- **Prof. Dr. Jalal M. Jalil**  
*Dep. of Electromechanics Engineering, University of Technology, Iraq*
- 9- **Prof. Dr. Khalil I. Al-Ali**  
*Dep. of Architectural Engineering, University of Technology, Iraq*

**Annual Subscription Fees:** 100000 ID (inside Iraq); 100 U.S.\$ (outside Iraq)

Correspondence should be addressed to:

Editor-in-Chief  
College of Engineering Journal  
Al-Nahrain University  
P.O. Box 64040, Al-Jadyriah , Baghdad- Iraq.

Web Site: [nahje.com](http://nahje.com)

E-mail: [m\\_editor@nahje.com](mailto:m_editor@nahje.com)

[jourenghah@gmail.com](mailto:jourenghah@gmail.com)

Phone No.: +964 (0) 7817202662





## FOREWORD

The Editorial Board of Al-Nahrain Journal for Engineering Sciences would like to thank the Dean of the College of Engineering of Al-Nahrain University **Assist. Prof. Dr. Mohammed A. Mohammed** for his continuous encouragement, advice and financial support for this issue.

Special thanks and appreciation are devoted to all members of the Consulting Committee and referees for the great effort spent on the preparation of this issue.

Thanks, are extended also to **Mrs. Saja H. Abdulrazaq** who helped in typing and in various operations necessary to produce the manuscript of this number and to **Miss Sheelan S. Kamal** who did the Linguistic Review for all the issue.

The Editorial Board welcomes all comments and constructive criticism from contributors, referees and readers in order to improve the Journal .

*Editorial Board*

